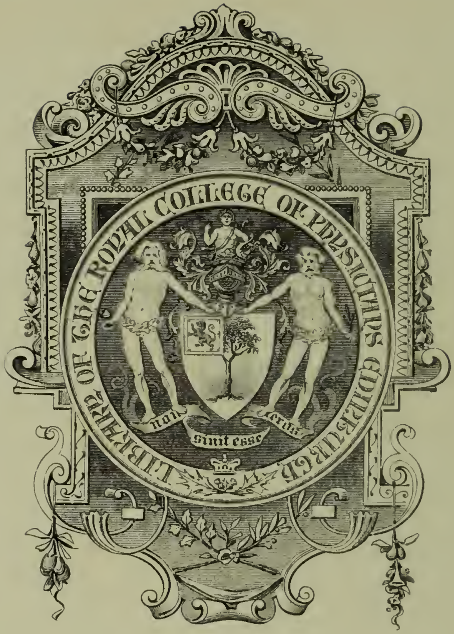
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PREVENTABLE CANCER

A STATISTICAL RESEARCH

BY

ROLLO RUSSELL

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LONGMANS, GREEN AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA
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PREFACE

THE facts and figures gathered into this book represent only a part—the most valuable part—of materials which I have examined in the course of the investigation. Owing to the large amount of matter concerning cancer in England, Germany, France, and America, I have had to confine myself generally only to writings bearing on the statistical side, though the chief pathological or clinical contributions have not been ignored where they seemed to throw light on causes. Most of these, as well as most of the books of travel and racial and ethnographical studies which I consulted, have not even been mentioned, but a few representative observations are quoted. I have dealt less with the causes of cancer in women than in men, because I think that they would require some acquaintance with gynæcology; but I think that the habits of the nation, men, women, and children, have a great deal to do with the preparation of the "soil," the constitution, for cancer; and that heredity, through the paternal as well as the maternal side, may to some degree affect the prevalence of the disease in women. We see a like inheritance of gouty tendencies; indulgence in stimulants of many kinds often bears worse fruit in the descendants than in the more robust transgressors themselves.

I gratefully acknowledge the help given me by the Embassies and Legations of several foreign countries, by Government Departments, by the United States Census Office, by Dr. Bertillon of the Bureau de Statistique, Paris, and Dr. Guillaume, Director of Statistics, Switzerland, by Librarians in England and Switzerland, by the Heads of Monasteries, and by the Scottish Widows' Fund Assurance Society.

The English and Irish Registrar-Generals' Reports and Inquiries have been of great value throughout.

I trust that the rather uncouth manner of the treatise, almost congenital to a product so full of exact references, will not deter those interested from following the data to their issue in conclusions.

The evidence in its totality is sufficient to justify crucial experiments on a large scale in relation to particular causes, though the unpremeditated experiments afforded by differences in habits in communities already give testimony in bulk which can hardly be excelled, for these tests have taken place in varieties of conditions, natural and regulated, over long periods of time. It is clear that in this, as in other matters, an extension of science into common life can do much for the regeneration of the race.

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ERRATA

Page 23, line 12, and Index, p. 166, *for* "Hunter," *read* "Hunting."

Page 47, line 8 from top, *for* "7," *read* "0·7."

Page 47, line 9 from top, *for* "Portugal consume much more—60 to 100 litres per," *read* "Portugal consume 60–100 litres of wine per."

Page 61, line 4 from top, *for* "Herzmann," *read* "Heinemann."

Page 61, line 8 from top, *for* "Dr. Espine," *read* "D'Espine."

Page 119, line 6 from top, *for* "(No. 11)," *read* "(No. 13)."

Page 119, line 8 from top, *for* "(No. 12)," *read* "(No. 14)."

Index, p. 167, under Williams, W. R., *for* "166," *read* "136."

PREVENTABLE CANCER

INTRODUCTION

In a small book published in 1907, as well as in a larger volume published in 1905, I put forward evidence which seemed to me for all practical purposes cogent, that the two chief operative factors in the causation of cancer are long-continued irritation and irritability, that irritation of a harmful kind may be produced by a *variety* of substances and influences, by toxic and irritating food and drink of *various* sorts, as well as by the ascertained irritants of the skin which are known to produce cancer, such as by the kangri worn in India, by soot, coal-tar, paraffin, &c., on the hands, and by irritants in the mouth, such as a sharp tooth, chewed betel composition, tobacco, hot cigar ends, &c., and by X-rays, emanations from radium, and intense concentrated heat.

Irritability seemed to be caused by many of the conditions of civilisation, sometimes by overwork or worry (the poisoning effect of which through the digestive tract has been established), as well as by the chronic disturbance of digestion, and by many articles of food and drink of a kind which increase toxicity, nervousness, or acute sensibility, such as tea, coffee, excessive meats and sweets, &c. Many of these foods and drinks are taken at a temperature far higher than what the outer skin can bear;[1] some are known as the certain causes of gout, nerve troubles, rheumatism, &c., partly owing to the strong actual poison which they contain and partly owing to excess causing digestive troubles and an internal self-poisoning which the system cannot always easily dispose of or withstand.

It is established in all medical practice that these excesses and poisons, including the poisons arising through overwork, worry, and distress, do cause a number of serious diseases and breakdowns. I wish to show reason for attributing to the same factors a large proportion of the cases of cancer in civilised countries.

The position of the question of cancer-causation resembles in one respect the position of the question of malaria-causation a few years ago. All the elements for the discovery of the cause were there, but their combined significance was missed. The effect of drainage, season, height above the ground, neighbourhood of pools, and of mosquito nets had been observed. But the step, now obvious, of attributing to mosquitoes the diffusion of the malaria infection was not taken. In a book published in 1891, I suggested nearly all the measures now found effective, including the use of oil for coating stagnant pools. But I was blind to the double cause. The connection between the insects and the fever might have been proved by comparative experiments with nets in camp. The importance of the step was missed.

The discovery of the malaria microbe in the mosquito by Manson and Ross, following Laveran's discovery of the organism, led to a proof of the etiology beyond question.

---

[1] For experimental tests of high temperatures in ordinary foods and drinks, see Appendix II.

In the case of cancer, the lines of evidence are so numerous and so converging, that the inference of real causes from a large collection of statistics, and from considerations put forward by medical observers of great experience, seems conclusive.

Yet an opposite contention is put forward unremittingly against the views and conclusions above stated, and is given the most prominent place in public prints, both scientific and popular. It is necessary that the negative doctrine should be carefully examined as respectfully and impartially as possible.

In the two books alluded to, I treated the connection of cancer with modern habits rather fully, and concluded that wherever much animal flesh or other rich proteid food and much tea or coffee were taken, there was much cancer; that these drinks produced predisposing effects in the course of generations; that heavy beer-drinking brings about a high rate of cancer mortality; that in many countries the amount of rich and proteid food, and of theine, caffeine, alcoholic, uric-acid-forming, and other poisonous matter consumed daily were very much larger than the amount required or disposable by the body; that in many cases the food was four to six times the physiologically appropriate maximum; and that sugary stuffs, alcohol, tea, coffee, &c., were habitually used in quantities ten to twenty times larger than would be prescribed exceptionally if these were used as drugs, which many of them really are. Among other conclusions were these: All countries or parts of countries which used much flesh, beer, tea, coffee, &c., had an excess of cancer. Every country not using these or other irritating substances in excess had little or no cancer. Life-abstinent and frugal communities formed out of and residing amid a population of opposite habits have a much lower rate of cancer. Rheumatism and heart weakness are favourable to the growth of cancer, and these maladies are largely produced by excess of food, and of toxins, such as tea, coffee, alcohol, beer, &c.

"There can be no reason why the irritation of a foreign body or poisonous substance should not produce cancer within the body as well as on the external surface" (p. 509 "Strength and Diet").

I brought forward much evidence to show the disastrous effect of excess in diet, of stimulants and of alcohol, especially in the form of beer, and of "hot drug drinks," such as tea and coffee. "A drug, belonging to the class of potent vegetable poisons, is the ordinary daily drink of millions of people. Moreover, these drugs are usually drunk hot." "Hot mashes, regularly given, have been proved to destroy the teeth of cows." It seems likely that hot mashes, brewers' grains, &c., and high-feeding generally have contributed to the production of the cancerous disorders occasionally found in cattle, and that food which can destroy teeth may both directly and indirectly weaken the healthy action of the internal organs. It is now known, since the medical inspection of school children has been established, that 50 per cent. have many "permanent" teeth badly damaged before they are fourteen years old, and in the remaining 50 per cent. a large proportion also have diseased teeth. This is a serious condition of affairs. Not only are boys with bad teeth likely to be rejected for army and navy, but their digestion and general health and efficiency are likely to be weakened throughout life. And this new and miserable destruction of the teeth of the young must be a sign of something wrong in their nurture. It is not only a question of cleanliness or toothbrushes. Their great-grandfathers in the country had perfect teeth even up to old age. It is the use of wrong foods, incessant sweets, and hot food and drinks which causes the damage.

It was contended that the same and some other accompaniments of modern ways of living are responsible for the increase of cancer. The seven countries consuming the largest amount of coffee had out of all the nations of the world the highest rate of cancer; England, which consumed the largest quantity of tea per head, has now about the maximum cancer rate, when the rates are duly corrected. Last year, 1911, the amount consumed per head rose to 6·53 lbs.

While cancer has been increasing in Europe and America, heart disease, rheumatism, gout or gouty conditions, nerve diseases, insanity, and suicide have also increased. At the same time, the birth-rate and the ability to suckle infants rapidly declined both in Great Britain and in the Colonies, and especially among the highly-educated classes in Europe and America.

These maladies and miseries are known most certainly to be caused by inappropriate food and drink, by the excess of poisons daily imbibed, and by the unnatural conditions of modern civilised populations.

"The invariable condition of exemption is plain living, without addiction to toxic drinks, and generally a fare of vegetable products or fruit, with little animal food." But animal flesh by itself did not seem to cause much cancer. ("Reduction of Cancer.")

A wider investigation has confirmed these opinions, and the variety of causes of irritation which increase the prevalence of cancer has become more manifest. The part played by heat affecting the delicate internal organs and mucous membranes must be of great consequence, for, as will be detailed further on, it appears that substances are continually being laid on the inner tissues at a temperature far beyond what can be borne by the outer skin.

This may explain partly the occurrence of irritation and disturbance, sometimes leading to cancer, in persons who live most temperately. There are very few who really conform to a diet both cool and frugal, free from undesirable toxins or irritants.

It is necessary in an inquiry of this kind to consider each part of the subject without prejudice and with circumspection, and not to be bound to any unsupported tenet; at the same time to be not too insistent on absolute proofs where the most that can be expected is the combined strength of cumulative evidence. If the conclusions reached are sound, they can happily be verified in less than a generation. As a matter of fact, verification can be approached to-day.

CHAPTER I

THE NATURE OF CANCER

The following quotations from the writings and reports of investigators, as well as of medical observers of great experience, will give a fair idea of the present state of scientific opinion on the nature and mode of origin of malignant growths.

Mr. W. Roger Williams, for many years Surgical Registrar at the Middlesex Hospital, London, considers that "tumour formation may be regarded as a phenomenon of the same order as reproduction in general, that is to say, as a special form of overgrowth of the individual. . . . It will be maintained in the sequel that, in ultimate analysis, a tumour is the outcome of an abortive attempt of certain cells to repeat agamically some portion of the normal ontogeny—hence individuation is the cardinal feature of every tumour. . . . Variation, mutation, tumour formation, what are these but different degrees of the same process . . . ? In the sequel, it will be shown that the determining factor, the true cause of all these variations, is nutrition, using the term in its widest sense."

"Malignant tumours consist mainly of albuminous or proteid substances; . . . when excessive quantities of such highly stimulating forms of nutriment are ingested, by beings whose cellular metabolism is defective, I believe there may thus be excited in those parts of the body where vital processes are most active, such excessive and disorderly proliferation as may eventuate in cancer."

Dr. E. B. Wilson, whom Mr. Williams calls the ablest exponent of cellular biology for English-speaking people, has maintained that all the facts at our command indicate that the tissue cells possess the same morphological organisation as the egg cell or the protozoön, and the same fundamental physiological properties as well.

"The particular outcome of the process in any given case," proceeds Mr. Williams, "is shown to be due to the influence of the conditions of nutrition. . . . This being so, it is easy to understand, under favourable conditions, certain cells may take on an independent action, growing and multiplying, without regard to the requirements of adjacent tissues, and of the organism as a whole." The tumour is a special form of overgrowth.

In the course of his exposition, the author contends that a knowledge of the facts brought forward enables us to understand how quasi-malignant tumours, comprising proliferous epithelial elements, may be caused by many various extrinsic agents, *e.g.* traumatic, microbic, chemical, &c.

"Any kind of stimulus capable of exciting the local cells to undue proliferative activity may suffice. And since the ontological history shows that for the requirements of physiological life, intrinsic stimuli are by far the most effective, so it is likewise probable that under pathological conditions tending to tumour formation, the same kind of stimuli prevail, such as serve as nuclear pabulum probably being in the first rank." [1]

---

[1] "The Natural History of Cancer." London: Heinemann, 1908.

In a work on Duodenal Ulcer,[1] the author of that book states that "we are now well informed of the fact that chronic ulcer of the stomach in some cases leads to malignant disease. Cancer of the stomach appears to begin with a chronic ulcer in something over 60 per cent. of cases." But opinions differ on this.

If this is the case, it becomes of great importance to ascertain the causes of chronic ulcer.

From Stelwagon's "Diseases of the Skin," [2] we learn that Hartzell concludes that the present state of our knowledge seems to justify us in regarding it as fairly well demonstrated that carcinoma results from a profound and more or less permanent alteration of the mechanism of cell division. "This alteration may, in my opinion, result from long-continued irritation of a mechanical or chemical kind, including under the latter the effect of toxins resulting from micro-organisms. Accordingly it seems likely that the immediate causes are multiple." [3]

Sir Malcolm Morris wrote in 1908 that cancer of the skin has a predilection for certain sites—mouth, anus, vulva, and eyelids; moist parts; exposed parts, the face and hands; a wart or mole or ulcer may be the starting point.[4]

Sir Alfred Gould, in the Bradshaw Lecture[5] of December 1910, asserted that "we are unable to attribute the disease directly to the influence of race, of climate, of diet, of occupation, of soil, of the subtler accidents of civilisation, or to any of the associated or complex conditions that may be summarised as environment. . . ." Certain occupations, he admitted, are assuredly attended with liability to cancer—chimney-sweeps, workers in X-rays, tar, and paraffin; circumcision greatly diminishes the local disease in Mahometans; the kangri, &c., increases its prevalence; but "we may not regard any of these conditions as the essential cause of cancer." "We must guard against confusing the predisposing and subsidiary factors with the inevitable constant cause of the disease."

---

[1] "Duodenal Ulcer," p. 245. B. G. A. Moynihan. Philadelphia and London: W. B. Saunders Co., 1910.

[2] Philadelphia and London: W. B. Saunders Co., 1910.

[3] Hartzell, "Etiology and Pathology of Malignant Diseases of the Skin affecting Epithelial Tissue," *Journal of Cutaneous Diseases*, 1900, p. 435.

[4] "Diseases of the Skin." M. Morris. Cassell & Co., 5th Edition, 1911.

[5] *Lancet*, December 10, 1910. Sir Alfred Pearce Gould, K.C.V.O., M.S. Lond., F.R.C.S. Eng., Senior Surgeon to the Middlesex Hospital. The Bradshaw Lecture.

Irritation, he continued, causes increased cell multiplication and defective intracellular metabolism. The life of a cell is not to be expressed in periods of time, but in terms of its multiplication and proliferation. Chronic irritation is equivalent to the ageing of a tissue. It causes changes akin to old age. The influence of alcohol on the incidence of cancer is really important. The cancer incidence in any trade varies with the attendant habits as regards alcohol.

These opinions concerning causes are widely held. But is it possible to maintain them all? Are they not self-contradictory? Much depends upon the use of the word "directly." If certain occupations, if certain habits of drinking, if certain diets entail a great excess of cancer, and if certain other bland or plain diets, and avoidance of irritants confer a great freedom from liability, then, for practical purposes, to multitudes of people, to the world in general, it does not much matter whether the cause is direct or indirect; that is, to a very great extent they may escape or incur cancer according to their mode of living. If alcohol be a potent cause, as it is admitted to be, then on this ground alone diet becomes of importance, because certain dietaries, especially those which exclude flesh, bring with them temperance or non-indulgence in alcoholic drinks. So environment, conditions, customs do appear to have power to kill or save.

When it is said, as above quoted, that we may not regard any of these conditions as the essential cause of the disease, and that we must guard against confusing the predisposing and subsidiary factors with "the inevitable constant cause of the disease," is not the idea of an *inevitable* cause, apart from the factors of habit, an unnecessary and deceptive assumption?

Take another common malady, rheumatism. It is difficult in many cases to discover the cause. But there is, first and often, predisposition, either inherited or acquired. Secondly, there is improper diet of some sort, excess of wine or beer, or tea, or sour fruit, or meat, or sweet things, or starchy food. Here we may call the erroneous habits either subsidiary or essential causes. We cannot easily alter the predisposition, at least in one generation, but we can save most of the predisposed from incurring the disease. There is practically no entity rheumatism, to which improper or excessive foods are mere subsidiaries or provocatives. There is no doubt liability in the great majority of people, living as they do live now, whenever they incur exposure to cold and damp, as well as to the toxins of flesh, tea, or alcohol. But even this liability is reducible. What we have existing is in fact a population far gone from primitive soundness, and so somewhat liable to the disease, always rendering themselves more open to an attack in force by their addiction to incorrect food and clothing. It is certain and beyond question, as has been shown by explorers and by common experience in climates both arctic and tropical, that by due care rheumatism can be avoided, and that even sleeping on snow or wet ground and in wet clothes has in many cases not been followed by any ill effects.

Now may we not, at least up to a certain point, apply similar considerations to cancer? Even if all human beings beyond middle age be regarded as liable to the disease, are not conditions practically of the greatest importance?—is it necessary to assume that in the best conditions there will be anything approaching the present mortality? When we see that such habits as the chewing of betel composition, hemp, &c., the wearing of the kangri, ingestion of alcohol, arsenic, &c., produce cancer in people who otherwise would not have had it, and where it is, apart from these habits, extremely rare, is not the probability great that these things, and many other things which give rise to continual irritation and irritability of tissues, are practically the causes of cancer?

The scientific reports and the Annual Reports of the Cancer Research Fund contain very full descriptions of the experimental investigations and of the pathological and biological doctrines of the nature of cancer from the point of view of the laboratory. I will here only quote three sentences. "It does appear as if the irritating stimulus which produced this result might be of the nature of a chemical agency in the blood." "Some kind of irritating stimulus applied to the plant's tissues will produce them. The birth of cancer consists in the application of some kind of irritating stimulus to the ordinary cells."

Mr. E. Bashford's pamphlet, "The Application of Experiment to the Study of Cancer," from *Science Progress*, July 1907, contains an instructive summary of the main results of his pathological researches.

Mr. Bashford, in an article in *Nature*, as well as in publications of the Research Defence Society, affirms that "there are natural constitutional conditions which are favourable, and others which are unfavourable, to the growth of a tumour."

"The soil can be modified experimentally."

"Hypersensitiveness may be induced by many different agencies."

"Every day of the year about 50,000 persons are suffering from cancer in England and Wales."

"All the facts point to the acquisition of cancerous properties by what were previously normal connective tissues."

"Two factors have proved to be of primary importance in its development; one is the alteration within a circumscribed area of what were normal into cancerous cells, either under the influence of unknown causes in the body itself, or through the mediate intervention of diverse external chronic irritants, which may be actinic, chemical, bacterial, mechanical—in short, are legion; the other factor is the constitutional condition of the living body which may favour or hinder the growth of the limited number of altered cells into a tumour."

Dr. Victor Bonney, quoted by Sir Alfred Gould, showed that interference with the continuity and perfection of the subepithelial elastic tissue layer always precedes a sarcinomatous growth and that cancer never originates in perfectly normal tissue.

Chronic irritation, "by adding to the frequency of cell division, produces the special condition of cellular old age; it is indeed equivalent to the ageing of a tissue." It stimulates but hastens changes akin to those of old age.

Long exposure to X-rays causes cancer.

As to the effect of alcoholic indulgence, Newsholme shows that cancer is represented by one hundred among non-abstaining males, compared with seventy-two among abstainers.[1]

"All these so-called causes—age, chronic irritation, X-rays, and alcohol agree in being conditions that wear out the cells of a part; they add to the number of cell-generations, . . . they lessen the hold over the cell of the great primal cell law, and so they cause cancer."

In their book, "Induced Cell-reproduction and Cancer," Messrs. H. C. Ross and J. W. Cropper wrote: "We know now that cancer is not, as was believed, a scourge peculiar to man, for it has been found in practically all vertebrates; that it bears no relation to food or climate," &c.

Similarly, in an advertisement and appeal by the Governors of the Middlesex Hospital, inserted in the *Times* in 1910, they declared: "Cancer is not hereditary, not infectious." "Cancer is found in all races of the human family; it exists also in cattle, horses, and other animals. This wide range of inquiry, coupled with minute scrutiny, disposes, as scientifically untenable, of theories that cancer is the result of meat-eating, or of vegetarianism, or of alcoholism, or that it can be associated in any way with the particular diets and ways of life. . . . The cancer cells are embryonic, the same cells as those from which the embryo develops. . . . That theory regards cancer as the outcome of an intrinsic morbid condition of the body. . . . In England and Germany scientific opinion tends towards this theory. . . . It has been established, too, that cancer never attacks perfectly healthy tissue, but is preceded by other definite tissue changes. Local irritation has thus come to be known as a predisposing cause of cancer. Thus cancer of the lip often follows the constant pressure of a clay pipe at the same point. Hence the greater frequency of cancer of the mouth among males. . . . In Ceylon and India it is frequent among women, from their habit of chewing betel nut, and sleeping with the plug in the cheek at the exact point where the cancer starts. . . . Of all persons over the age of thirty-five now living, one man in every twelve and one woman in every eight will die of cancer."

---

[1] Sir Victor Horsley, through a calculation of the cancer rate of Rechabites, has arrived at a similar result.

Sir James Sawyer, remarking on Mr. Roger Williams' previous communication, wrote:[1] "I have long thought that the accepted increase of cancer in England in recent years is due to the increased feeding of the population, and especially to increased feeding upon meat. . . . The malady has many of the features of a local overgrowth of tissue elements, and such appears to be favoured by excessive feeding and especially by feeding excessively and for a long time upon meat." The men of the masses of the people have increased their meat-eating most, and it is amongst these that the greatest increase of cancer has taken place.

Dr. W. Ewart, Physician to St. George's Hospital, in a lecture to the Chelsea Clinical Society, said: "A temporary vegetarian diet seems to me as much indicated by the rheumatic state as the avoidance of animal food."[2]

---

[1] *Lancet*, March 24, 1900. Sir James Sawyer, M.D., F.R.C.P. Lond., F.R.S. Edin., Consulting Physician to Queen's Hospital, Birmingham.

[2] *Lancet*, March 17, 1900.

Sir Isambard Owen observed that the common belief that beer was obnoxious to [produced] rheumatism received a certain amount of support; the proportion of beer to spirit drinkers in rheumatic cases was in excess.

Adami, writing of squamous-celled cancer epithelioma, says: "It is necessary to keep in mind the existence of metaplasia, whereby through continued irritation a columnar may be converted into a squamous epithelium.

"A form of chronic bronchitis in a mouse's lung is frequent; this is regarded by Tyzzer as due to the irritation of large interbronchial crystals, and as throwing light upon the frequency of epidermoid carcinoma in the lungs of these animals."[1]

In the last edition of the *Encylopædia Britannica*, under the heading of "Parasites," the following observations occur:—"Parasites cause a great deal of damage, *e.g.* by admitting dangerous microbes; by damaging walls of intestines, and so admitting various bad microbes; by *irritation* causing galls, pearls, or hypertrophia; by migration to dangerous parts; by abstracting some particular food substance, such as glycogen." The metabolic balance may be overthrown; appendicitis may be caused; the blood-vessels may become blocked; tuberculous infection of the gut may be favoured.

Multiple neuritis is caused by many toxic conditions of the blood, especially lead, arsenic, and alcoholic poisoning; also by diabetes, &c.

In the article "Digestive Organs,"[2] by Dr. Andrew Gillespie and Sir Michael Foster, it is stated:—"The digestive organs are peculiarly subject to malignant disease, a result of the incessant changes from passive to active conditions, and *vice versâ*, called for by repeated impaction of food; while the comparative frequency with which different parts are attacked depends, in part, upon the degree of irritation, or changes of function imposed on them. . . . Walsh, out of 1306 cases, found 60·8 per cent. near the pylorus. . . . Cancer of the liver follows that of the stomach and rectum in frequency of occurrence, and is relatively more common in females than in males.

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[1] Adami's "Principles of Pathology," p. 797, vol. i. Philadelphia: Lee & Fabiger, 1910.

[2] *Encyclopædia Britannica*, New Edition.

"The comparative frequency in parts is as follows:—

"Œsophagus and stomach	31·78
Intestines	20·42
Mouth and pharynx	30·27
Liver	10·02"

The following quotation from a recognised authority refers to the causation of gout, and has a distinct bearing on the genesis of cancer:—"It is well recognised that the poisons of lead, syphilis, tobacco, typhoid, acute rheumatism, scarlatina, and other acute specifics, frequently carry arterio-sclerosis in their train, and that worry, anxiety, and concentrated brainwork are very liable to produce it. But this I am prepared to affirm, that by far the commonest cause is to be found in those dietetic and other errors, such as excess of flesh foods, alcoholic drink, and insufficient exercise, which all agree in associating with the gouty state. . . . Goutiness is to the arteries what rheumatism is to the heart.

"If we admit auto-intoxication—and there is no escaping it—the connection between gout and kidney disease seems simple enough.

"The toxin circulating in the blood has as one of its results the irritation possibly of the vaso-motor centres, but almost certainly of the blood-vessels."[1]

The following are given in the *Practitioners' Guide* as the chief causes of neurasthenia: strain, worry, mental shock, overwork, sexual excess, acute illness, especially influenza and typhoid, abuse of alcohol, tobacco, tea, coffee.

The disease may have little or no relation to cancer, but it may be of some value to note the powerful effect of the toxic matters last mentioned, in connection with "hypersensitiveness," on the nerves and system generally.

Without in any way connecting cancer directly with brain disease, we may observe that Sir Thomas Clouston considers that mental disease is "in no way different from ordinary disease."[2] This, I take it, signifies that it is due to definite causes, generally of a material kind. "It is disease of the cortex of the brain. At Cairo the chief cause is Indian hemp, hashish," as alcohol is with us. "The weight of evidence is greatly in favour of the transmission of evil results from drunken parents to the children." The other most common poisons causing unsoundness of mind are opium, morphia, Indian hemp, cocaine, chloral, lead, and henbane. They are all brain poisons. Influenza is a nerve poison. The epidemic of 1889–90 "left the European world's nerves and spirits in a far worse state than it found them in."

Fatigue, as Mosso has observed, whom Clouston quotes with approval, produces a subtle poison in the digestive tract, and so affects brain and mind. Many unfavourable mental stimuli produce poisons.

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[1] From "Minor Maladies," by Dr. Leonard Williams, 1908.

[2] From "Unsoundness of Mind," by Sir Thomas S. Clouston, President of the Royal College of Physicians, Edinburgh.

To the effect of certain damages, diseases, or brain poisons any brain may succumb. "Socrates or Marcus Aurelius would have become insane if they had continuously poisoned their systems with bad London gin." Similarly it might be said that few can remain healthy under the continuous poisoning of the tissues and blood and under the stimulation of scalding foods.

Metchnikoff has said that "the refinements of civilisation have made demands on man's animal frame too heavy to meet, and to this we may trace at least most of the ills man is heir to."

"It would be true progress to revert to the simpler dishes of our ancestors."

Dr. Brand, V.P., M.D., C.M., in considering the etiology of cancer, has mentioned[1] the following factors:—irritation of lips by tobacco pipes, of the tongue by ragged teeth; chronic superficial glossitis; a prick of a bone; scalding liquids, chronic dyspepsia or ulceration; foreign bodies; scybala; eczema, &c.

Messrs. S. Shattock and C. A. Ballance favour the parasitic theory. "The source of a tumour is the preexisting tissue." "It is not possible," they write, "to separate tissue overgrowth which arises from inflammation from the class of tumours."[2]

According to Dr. West, laceration of the cervix uteri may lead to cancer, and the Cancer Commission of Harvard University reported that the part played by injuries and chronic inflammation, although repeatedly noted in clinical observation, has been reluctantly accepted by many pathologists. "The constant attempts of nature to heal a particular part often forms an important element in the development of cancer."[1]

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[1] *British Medical Journal*, July 26, 1902.

[2] "General Pathology of New Growths," Allbutt's *System of Medicine.*

One of the most weighty utterances for the present purpose, if I rightly understand it, is in Mr. Bashford's pamphlet already alluded to, where he concludes: "I have shown that even in normal animals the soil plays an important part, and a part which can be modified at will. I have indicated that the soil may play an important part in the spontaneous appearance of cancer in individuals." It is the intention of the present essay to demonstrate the soil, or rather the condition of the body produced by human agency, which favours or hinders the development of cancer. The writer recognises with admiration the work which has been done by medical leaders and statistical investigators, and has found in foreign countries a profound respect for British statistics; the labours of our chief statistical authorities have indeed done more for the good of humanity than we in England imagine.

I know that in this contribution there must be mistakes, especially faults of arrangement, due to my wish to give chapter and verse for references, and I cannot expect that every figure will be found to be correct. But I have carefully examined and reverified every part, and am quite certain that the authorities quoted are among the best existing. The material in the main is sound, and I hope the induction also.

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[1] *The Postgraduate,* April 1911. New York.

CHAPTER II

STATISTICS OF CANCER

I

The object of the present inquiry is to gather from all available sources the facts in regard to the amount, distribution, and incidence of cancer, to consider their import and bearing, and to arrive at a preliminary estimate of some of the chief causes which increase or diminish its prevalence.

Statistics form the groundwork of science, the armoury for action; they contain many secrets of health and life, and in my view the study of statistics relating to disease might yield as rich a harvest for the benefit of mankind as any other field of research. The Reports of Registrars are full of significance, and might long ago have been employed for a war against maladies in which victories would have been certain, saving millions of people from suffering and early death, and raising the health of the nation to a high level of strength and efficiency.

The question of causation of cancer, concerning which differences of opinion have divided pathological investigators, is open, so far as statistical and general features are concerned, to the discussion of all careful observers, who feel the possibilities which lie within the scope of the broadest science. Laboratory experience and biological theory have within their purview an immense series of complex problems of extraordinary interest. But statistics impartially used, in connection with an appreciation of common and various human conditions, have also their high value for elucidating problems of disease. Fair consideration must impress us with the actual, and still more with the potential, capacity of statistics for demonstrating roadways, still to be engineered and faithfully made use of, for the well-being of the race.

Cancer is known to occur in many animals, but is exceedingly rare among the wild mammalia, such as cattle, horses, sheep, goats, and deer. They are almost immune; indeed I do not know if any case has been recorded of cancer in the larger and higher mammalia occurring during their freedom. It is much more common among domesticated creatures, such as cows, pigs, poultry, and fattened beasts, more common in cats, and most common in dogs. Malignant tumours have been seen in 2·8 per thousand of 47,362 cattle slaughtered in Glasgow.

Of 2647 animals specially examined in the New York Zoological Gardens, not one was found to be affected. A racoon dog died of malignant tumour two years after admission. But, if we may judge by the experience of the Royal Zoological Society of London, where also Mr. Bland Sutton found no cancer, it is necessary to bear in mind that the life of animals confined in public gardens is quite unusually short. Dr. Chalmers Mitchell has recently exhibited in a very full paper how nearly all kinds of animals in the London gardens die long before the end of their natural term. On the other hand, any one who has kept a few animals under his personal care, with special attention, knows that they live to be old in a large proportion of cases. And in my small experience, during over forty years with horses, cows, and other animals, I have never known of any cancer among them. Dr. Mitchell has just recently informed me that no animal has been certified as having died of cancer as a primary cause at the gardens during the last two or three years, though a few cases of the disease were notified. Mr. Sawyer, formerly of Richmond Park, writes to me that cancer-like tumours occurred among the deer there. But in Windsor Park, I am told, no case was seen. Mr. William Hunter has testified to the extreme rarity of cancer in the lower animals, and knew many veterinary surgeons who had never seen a case.[1]

Friedberger and Fröhner, in their great work on Veterinary Pathology, state that the domestic animals, compared with man, appear to be almost immune from cancer of the stomach. Among 70,000 dogs treated at the Dogs' Home, only one case occurred; among horses none have ever been described in Germany. Cancer of the liver frequently occurs in pampered dogs, rarely in horses or other domestic animals. Sarcoma and melanoma of the liver occur also, and angioma are found in cattle.

Cancers are rare in the stomach, liver, uterus, intestine, tongue and mouth, in comparison with human beings. But mammary cancer is particularly common in dogs.

Of 60,471 diseased dogs examined by Fröhner in Berlin, 1·9 per cent. had some form of tumour; in 1306 dogs Stukar found 5·5 per cent. with cancer; and in 3525 dogs Semmer reported 8 per cent. as cancerous.

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[1] "Signs of Health and Diseases in Animals," *Journal of the Royal Sanitary Institute*, 1901.

The various human types of the disease are found in dogs.

Of 215,307 horses under treatment in Berlin, only 103, that is, 0·046 per cent., or about 400 in the million of diseased horses, were cancerous. Oxen were found affected in the proportion of 7 in 5795. Pigs do not seem to show a higher percentage, but records are deficient. In sheep, only seven cases were found among a large number, and at Halifax only one case occurred among 6800. Goats, deer, and rabbits are very seldom attacked in their natural way of living. Monkeys, even in captivity, seem to be almost entirely free from cancer. It is stated that among the many thousands which have been kept in Europe, only about six cases have ever been reported.

It has been observed by Rayer, Leblanc, and others that carnivorous animals are more prone to cancer, *cæteris paribus*, than herb or grain-eating animals. Eagles and vultures in the Jardin des Plantes have been affected, but poultry in the farmyard are also liable.

Plants are subject to new growths. In plants and in fishes the disease may, I think, very frequently be started by parasites producing irritation, and thus may assume the character of an epizootic. Irritation by insects has been proved to be an effective cause of galls and tumours.

In estimating the liability of animals, it should be borne in mind that they are frequently infected by various parasites, internal and external,[1] and greatly

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[1] In the article by George Fleming and James M'Queen on Veterinary Science in the *Encyclopædia Britannica*, it is stated:—"Of all the domesticated animals the dog is by far the most frequently infested with worms. A very common round worm is Ascaris marginata (3 to 8 inches long), a variety of the ascarid of the cat. The symptoms are emaciation, irritable skin, colic," &c.

The dog harbours eight species of Tæniæ and five species of Bothrioworried by flies, warbles, &c.; that domestic animals are fed more regularly and more richly, than in the wild state, and have less exercise, that many are mutilated, that most are subject to various diseases incident in domestication, that many are fed with hot mashes, brewers' grains, &c., and that many are unnaturally pampered. Dogs are extremely subject to worms and other parasites, and pick up many sorts of foul garbage. Many are badly affected by lying near a fire. Wild animals have frequent long fasts, and have to search for their food.

It is doubtful how far these observations on animals have a bearing on the human malady.

Proceeding to the enumeration of the recorded prevalence of cancer in different races and different parts of the world, I wish to state that the figures given represent the best records obtainable, but are in many respects not strictly inter-comparable. Great caution must be exercised in comparing different countries with each other, owing to differences of enumeration, classification, diagnosis, &c. Several qualifications have to be remembered. In a large number of cases, probably nearly all, the rates are as stated in the Official Returns or State documents, or by competent medical observers. I have brought the various rates, per hundred, or ten

cephalus. Tænia serrata, about 3 feet in length, is found in about 10 per cent. of English dogs. T. marginata is the largest cestode, 5 to 8 feet in length, and is found in 30 per cent. of dogs in Great Britain.

A cystic form of T. serialis is found in rodents.

Bothriocephalus latus, 25 feet long and 1 inch broad, is found in the dog and sometimes in man. Its larval form is found in pike, turbot, tench, perch, and other fishes.

There is a large number of lice, fleas, ticks, acari or mange mites and larvæ which cause diseases of the skin. Chorioptes live on the exudation produced by the inflammation which they excite.

There are many vegetable parasites on animals.

thousand or hundred thousand, to the common rate of per million persons living, which does away with fractions.

In 1907, Dr. J. Tatham informed me that in the case of Norway the causes of death were stated to be incomplete. The returns for Spain "apparently" referred to the whole country.

In France, Denmark, Sweden, Roumania, and Bulgaria, the figures refer to towns only. In France, Switzerland, and possibly some other countries, fatal tumours are included with cancer, but the excess so produced is not large. The districts of towns are not strictly comparable with each other, owing to varying immigration at various ages, the presence or absence of hospitals and other factors. Different counties also have differences of age distribution.

MORTALITY IN COUNTRIES AND TOWNS

The following statistical abstract gives a summary of the recorded prevalence of cancer in different races and different parts of the world :—

EUROPE

England and Wales	(1900)	828 (all persons, all ages)
,, ,, ,,	(1851–80)	857 (all persons over 25)
,, ,, ,,	(1881–90)	1844 (all persons over 35)
Canterbury	(1881–90)	1130 (all persons)
Chichester	(1881–90)	1180 ,, ,,
Scilly Isles	,,	760 ,, ,,
Durham	,,	320 ,, ,,
Derby	,,	520 ,, ,,
Bolton	,,	400 ,, ,,
Blackburn	,,	380 ,, ,,
London	,,	680 ,, ,,
London	(1903)	920 ,, ,,
London, Guy's Hospital		1 in 8 of all necropsies

London (Report of L.C.C. for 1902:—

City (Highest)	1440
Westminster, Marylebone, Hackney	High
Hampstead	980
Southwark	780
Bethnal Green	760

In cancer, excluding carcinoma, the City, Westminster, and Marylebone were highest, having a rate of 740 and 510. Bethnal Green and Southwark were lowest with 180 and 200, and Hampstead low with 290. In carcinoma the City and Hampstead were highest with 700 and 690, and Hackney and Stoke Newington lowest with 320 and 350.

In 1903 the rates corrected for age and sex distribution, hospitals, &c., were:—

Hampstead (highest)	1200
Marylebone	1190
Chelsea	1060

and the lowest were in Stepney, Bethnal Green, and other poor districts.

In Bristol there was a similar difference:—

Bristol (Clifton quarter, rich)	(1903)	1030
Bristol (St. Philip's quarter, poor)	,,	770

Aberdeen	(1900)	950
Birmingham	,,	850
Manchester	,,	780
Glasgow	,,	820
Liverpool	,,	770
Scotland	,,	800
Edinburgh	,,	1160
Shetland Isles	(1874)	160
Nairnshire (Newcombe)		973
Clackmannan (Newcombe)		541
Ireland	(1900)	610
,, (Kerry)	,,	260
,, (Armagh)	,,	1040

Spain (Alicante)	(1900)	290
,, (Andalusia and Catalonia)	,,	about 290
Gibraltar (natives)	,,	250
Seville	,,	850
Barcelona	,,	530
Madrid	,,	780
Italy (Genoa)	(1887–99)	590
Calabria and Apulia	(1900)	300
Abruzzi (Molise)	,,	350
Switzerland	(1898)	1320
,,	(1895–1904)	about 1280
Denmark (towns)	(1892–97)	1300

France (towns above 3000 persons)	(1900)	1040
Sweden (towns)	„	1020
Holland	„	930
Amsterdam	„	980
Norway	„	920
Prussia	„	590
Bavaria	„	980
Baden	„	1010
Saxony	„	950
Austria	„	700
Italy	„	520
Spain	„	390
„ (Almeria)	„	250
„ (Oviedo Province)	„	210
„ (Valencia)	„	280
Cagliari	(1887–91)	180
Sardinia	(1898)	170
„	(1900)	190
Sicily	„	340
Rome	„	770
Florence	„	1370
Milan	„	1010
Venice	(1900)	1030
Naples	(1899)	560
Belgium	(1880–87)	360
Hungary	(1900)	330
Budapest	„	720
Servia	(1895–1904) (estimated)	80
„	(1894–5)	67
Corsica (towns)	(1895)	320
Malta (natives)	(1822–34)	Nil among 3000 persons
Turkey		Rare
Austria (Slavonia, Croatia)	„	160

Austria (Dalmatia)	(1900)	190
Austria (Prague)	„	850
Cracow	(1887–98)	(?)3160
Paris	(1900)	1050
Rouen	„	1730
Lyons	„	1530
Bordeaux	„	970
Marseilles	„	690
Small towns:—		
Oulchy, Normandy	„	4000
St. Sylvestre Normandy (about 330 people)	(1880–87)	3630
Rocroi, Normandy	(1900)	2660
Chief Danish towns	„	1110
Copenhagen	„	1390
Stockholm	„	1100
Christiania and district	„	660
Petersburg	„	1000
Stuttgart	„	1270
Dresden	„	1250
Munich	„	1210
Berlin	„	1090
Cologne	„	910
Erlangen	„	2500
Strassburg	„	1180
Hamburg	(1898)	970
Brussels	(1900)	440
Geneva	„	1770
Lucerne (Canton)	„	2040
Valais (Canton)	„	(?)160

Registrar-General's Report for 1905. *Estimated Cancer Rates for Various Countries*

The following list gives the deaths from cancer per million persons living, deduced from the Registrar-

General's Return for 1905, pp. 94 to 106. Several qualifications must be applied, as described on p. lxviii of the Report.

	Average Annual Rate in 10 years, 1895 to 1904.	Rate in 1905 or nearest.
Switzerland	1280	1290
Holland	930	1010
Norway	870	950 (1904)
United Kingdom	740	756 men, 1005 women (all above 35 years, 2661)
England and Wales	820	890
Scotland	790	890
German Empire	730	780
Victoria	700	790
Austria	690 (1894–1903)	720 (1903)
New Zealand	620	650
Ireland	610	750
Prussia	600	690
S. Australia	590	670
New South Wales	570	650
Belgium	(?)	560 (1904)
Ceylon	56	53
Tasmania	550	540
Italy	520	550
Japan	490 (1899–1903)	550 (1903)
Queensland	480	670
Spain	430 (1900–1904)	470 (1904)
W. Australia	350	510
Hungary	340 (1897–1904)	400
Chile	(?)	290
Jamaica	160	190
Servia	80	100

As regards our Colonies, the large excess of males and of people under the oldest ages must be borne in mind.

In Webb's "New Dictionary of Statistics" a table is given showing the rate of cancer deaths in various countries for the period 1901–1905. The figures must be taken with the necessary allowance for different modes of legislation and differences in medical reporting and diagnosis in the different countries. It is observed by the editor that cancer comes next to tuberculosis in deadliness in civilised countries.

The figures for England and Wales are based on the mortality table constructed by Dr. J. Tatham, on the basis of the censuses of 1891 and 1901, and the number of deaths from 1891–1900. The Norwegian figures are from the census of 1891 and 1900 and the deaths in the period; the Austrian and Hungarian figures on the census of 1900 and the deaths in 1900 and 1901; the Dutch on the censuses and annual deaths; the Belgian on a similar basis; the French on the census of 1901 and the deaths 1898–1903; the Italian on the census of 1901 and the deaths 1899–1902; the Indian on the census of 1901.

Cancer Deaths per Million, 1901–1905

United Kingdom	840	Servia	100
Austria	740	Spain	450
Belgium	580	Switzerland	1300
France	980	Australian Commonwealth	650
Germany	780	New Zealand	670
Saxony	930	Ceylon	60
Prussia	650	Japan (Av. 1901–3)	520
Holland	970	United States (registration area, 40 per cent. of whole area)	680
Denmark (towns)	1280		
Hungary	390		
Italy	550		
Norway	940		

The following observations in the *Seventy-second Annual Report of the Registrar-General*, 1909, are of importance[1] in relation to a table giving the cancer death-rates for the foreign countries named: "For Hungary it is probable that the rates are understated, and in Ceylon the registration of causes of death is admittedly so imperfect that little reliance can be placed on the returns. In France, Denmark, Sweden, Roumania, and Bulgaria deaths from cancer have been tabulated for towns only; these countries are consequently not included." The rates are given as per 1000 persons living 1881–1909.

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[1] P. cxxvii.

Corrected Rates, 1901–1905.		1909.
Switzerland	1·10	1·11 (1908)
England and Wales	0·86	0·95
Netherlands	0·85	0·90
Scotland	0·83	0·94 (1908)
New South Wales	0·80	0·90
Victoria	0·76	0·82
S. Australia	0·76	0·86
New Zealand	0·75	0·82
Queensland	0·76	0·83
Tasmania	0·68	0·82
W. Australia	0·74	1·09
Prussia	0·64	0·74
Austria	0·69	0·72 (1908)
Ontario (crude)	0·52	(?)
Belgium	0·49 (3 years)	(?)
Italy	0·45	0·53
Spain	0·38	0·44
Hungary	0·38	0·43
Servia (crude)	0·10	(?)

For Servia the rate for 1892–95 was 0·06 and for 1896–1900, 0·08.

ASIA

Hongkong (1895–1904)	40·45 per million living.
Fokien Provinces, South China	1 in 203 hospital patients (*cf.* 1 in 20 for London)
India, Punjab	0·7 per cent. of hospital cases.
Central Division	0·7 ,, ,, ,,
Berar	0·7 ,, ,, ,,
Agra and Oudh	0·05 ,, ,, ,,
Bombay	0·05 ,, ,, ,,
Bengal	0·025 ,, ,, ,,
Madras	0·024 ,, ,, ,,
Assam	0·005 ,, ,, ,,

The population entering hospitals was adult, and the figures represent a much larger proportion of cases than would probably be found in the general population.

At the Mayo Hospital, Lahore, the proportion of cases during the ten years 1892–1903 was 1 in 55 of all patients, 792 altogether in the decennium from a population of 25,000,000. The yearly average treated was 266, or 0·08 per 1000 of all diseases treated. In the Lahore district both Mahometans and Hindoos are mainly non-flesheaters, seldom eating animals, but the Hindoos are not total abstainers from alcohol like the Mahometans. The most remarkable fact in the statistics of the Hindoos was the total absence of cancer in the stomach, no instance being recorded. There was another peculiarity in the great comparative frequency of the growth in a part of the body not attacked in Mahometans, who were circumcised and of cleaner habits.

In Kashmir, which lies high, and where the peasants live mainly on rice, by far the larger number of epithelial cancers in the natives treated during ten years were caused by the kangri, a fire-basket worn on or near the abdomen. About 1100 cases treated during the year were taken as malignant. As in the Punjab, visceral cancer is very rare among the Kashmir people. Of 486 epithelial cases, 363 were of the kangri burn variety.

In Assam[1] eight cases of cancer and sarcoma occurred during five years in a labouring population of 12,000 Hindoos at Adampore. Of 15,000 natives, mostly Mahometan, only three were seen with malignant tumours.

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[1] Dr. Dalgetty, *Journal of Tropical Medicine*, April 15, 1902.

Dr. Drake saw no case, nor heard of any, among many thousand coolies from India and in Assam.[1]

Dr. M'Leod,[2] from experience in the Calcutta hospitals, concluded that malignant tumours are rather common in Bengal, but in the Medical College, during five years ending 1883, there were only forty-nine malignant, and in 1886–90 only eighty-seven. Dr. Megaw[3] found that three per cent. of the total admissions were for cancer, 343 in nine years. The population of Calcutta was about 900,000, and of Bengal 70,000,000.

According to Davidson, in Bombay 0·1 per 1000 of all deaths were due to cancer; this is equal to 100 per million of all deaths. In Hyderabad, in 1883, out of 2637 operations in hospital only 2 were for cancer. In Bombay, in 1875, the cancer deaths were 1 in 20,000.

In Madras, during 1892–1901, patients numbering 4270 were treated for malignant tumours, about 2·5 of total admissions at the General Hospital. The population of the city was 500,000, and of the Presidency 40,000,000. Carcinoma of the mouth and tongue amounted to nearly half of all cases. These were attributed long ago by Sir Samuel Baker, in his book on Ceylon, to betel-chewing. This composition of lime, tobacco, hemp, and areca nut is burning and irritating.

The Imperial Cancer Research investigators examined 1589 cases from India; only 76 of these were from internal organs.

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[1] *Lancet*, vol. ii., p. 1809, 1904.

[2] *Operative Surgery in Calcutta*, 1885.

[3] *Indian Medical Gazette*, May 1905.

Ceylon[1]	Year ?	234 cases in the medical institutions out of a population of 3,812,931. The average number of cases is about 65 per million.
Ceylon (Colonial Report)	1897	50
Ceylon (Sir A. Perry)	1905	60
Ceylon Hospitals	1900	1 in 254 among 63,030 patients.
Burmah and Siam (Gowen, Rasch, Nightingale)		Rare.
Laos, north of Siam (Hansen)		Very rare.
Hong-Kong[2]	1895–1904	40·45 per million living.
„		Only 10 out of 15,365 post-mortems cancerous; 0·65 per 10,000.
Shanghai (Dr. Henderson)		Not uncommon.
Kuala Lumpur, Federated Malay States		Rare. 1·24 in 805 deaths among Chinese.
Tibet		Cancerous ulcers stated to be very common.

AUSTRALIA

Australia (all)	1900	573
„ (native whites over 35)	„	580
„ (foreign born over 35)	„	1370
„ (Chinese)	„	720
„ (aborigines 60,000)	„	Very rare. Years without a case.[3]
Victoria (Old Colony)	„	720
West Australia (new Colony, miners, &c.)	„	300
Queensland (South Sea Islanders)	„	No case seen in 11 years.
New Zealand	„	600
South Sea Islands[4]	„	Rare.
Fiji Islands[4]	„	About 20.
„ (Sir W. M'Gregor)	„	Extremely rare.
„ (Europeans in Fiji)	„	Not rare.

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[1] Further Correspondence, Cancer Research Scheme. Cd. 2342, Feb. 1905.

[2] *Ibid.*

[3] Dr. G. Cooke Adams, Dr. Roth.

[4] Report on Cancer in British Colonies, 1905. Blue Book.

New Guinea	Very rare. No case seen in 4 years.
Borneo (Pagel; Nieuwenhuis)	No case seen in 10 years.
Java and Sumatra	Very rare.
Philippine Islands	Very rare.

AFRICA

Egypt, Cairo (Dr. Engel, Director of Vital Statistics)	1891	1 death in 1028 compared with England 1 in 29.
Cairo (Hospital)	1889–91	0·6 per cent. of cases compared with London, 3·5.
„ Berberines and Soudanese[1] (Dr. Madden and medical men of Cairo)		Both sexes free.
„ Arabs and Copts[2] (Dr. Madden and medical men of Cairo)		Not very uncommon.
Egypt (Griesinger)		No case of cancer in stomach seen during many years' practice.
Algiers town (largely European)	1895	560
Algeria generally		Rare.
Oran (slightly European)	1895	130
Biskra, 8000 natives		No case.
Mostaganem, 16,000		No case.
Tunisia		Rare.
Morocco		Not very frequent.
Soudan, Somaliland, Erythrea		Not common.[3]
Uganda		Rather common.[3]
West Coast of Africa (Dr. Forde, &c.)		Very rare.
West Coast of Africa, Bathurst, Gambia (Hospitals)		No case in 9068 patients.
Gambia (Senior Medical Officer)		"Seems to be unknown in West Africa."
Gold Coast Colonies		No case seen in 10 years.
Senegal (Bornier)		None seen.
Kisumu		One seen in 2½ years.
Mombasa (Dr. Macdonald, Dr. Johnson)		None seen in 8 years.

[1] Vegetarian.

[2] Not vegetarian, more like Europeans in diet.

[3] See Appendix I.

Nairobi (Dr. Moffat)		1 case in 10 years.
Lagos (Dr. O. Johnson)		5 cases among Europeanised natives ; no other cases seen.
„ (Dr. Strachan)		One case in 14,090.
Cameroons (Plehn)	1900	Rare.
Jubaland		In 2 years no case seen, except some doubtful.
British Nigeria (Hospitals, &c.)	1900	No death among 5690 natives treated.
South Nigeria		One or two supposed cases.
Central Africa (Dr. Scott, Dr. Morris, Dr. Old, Dr. Hearsey)		Very rare.
Masailand (Dr. A. R. Sieveking)		Rare.
Nyassaland (Dr. Kellett-Smith)		Practically unknown.
Barotze country (Dr. Livingstone)		Absent.
Mashonaland, Bechuanaland		Reported absent.
Basutoland (Leribe Hospital)		Rare, 4 out of 3128.
„ (Maseru Dispensary)		Rare, 2 out of 4684.
„ (Mafeking Hospital)		Rare, 6 out of 2679.
Natal, Bantu people	1903	About 12 per million.
Natal, natives (Mr. Samuelson, Medical Secretary)		Never knew of a case.
Hottentot people		Rare.
South Africa (natives)		Very rare.
„ (Europeans, Boers)		Common.
Abyssinia		Moderately high.
Transvaal (Hospitals)		43 out of 5763 Europeans; 10 out of 3815 natives.

America

United States	1900	600
Maine	„	830
Vermont	„	810
Michigan	„	580
New Jersey	„	500
San Francisco	„	1120
Boston	„	760
New York	„	640
Chicago	„	630
British North America—		
Halifax	1891	540
Quebec	„	420
Montreal	„	390
Toronto	„	360
Mexico (European descendants)		Rather common.

Mexico (low country, natives)		"Almost unknown."
,, (high regions)		Not very uncommon.
Central America, Guatemala	1894	40
British Honduras		Rare.
Bermudas		1 in 33 deaths.
,, (white people)		1 in 18 deaths.
,, (coloured)		1 in 56 deaths.
Bahamas	1900	1 in 1231 deaths.
West Indies		Rare in natives.
,,	1840	Very rare, except among negroes living like Europeans.
Jamaica	1905	190
Trinidad and Tobago (Hospitals)	1900	1 in 102 cases.
Grenada (Hospitals)	,,	1 in 62 cases.
St. Kitts (natives 30,856)	,,	130
,, (Europeans 2463)	,,	No case.
Nevis (14,520 natives)	,,	No case.
Anguilla (4424 natives)	,,	240
,, (natives)	1892–1900	2 out of 479 deaths.
,, (whites)	1892–1906	5 out of 32 deaths.
British Guiana (Hospitals)	1903–4	105 out of 148,221 patients.
Brazil	1903	40
Rio de Janeiro (850,000)	1904	260
Uruguay	1897	470
Argentina (Buenos Ayres)	1900	910
,, (Tucuman province)	1898	100

DISTRIBUTION OF CANCER IN COUNTRIES AND DISTRICTS

From the above figures the following conclusions are derived:—

The countries with the highest rates in the world are Great Britain (corrected rate), Switzerland, Holland, Sweden and Norway, Denmark, Baden, Bavaria, Würtemberg. On comparing these with Dr. Bertillon's elaborate calculation of the relative individual money wealth of different nations, I find that Scotland, Belgium, and Switzerland are mentioned as exceptionally high in this respect. Holland, too, is very high.

The countries with the lowest rates in Europe have been Italy, Hungary, Dalmatia, Spain, Portugal, Sardinia, Corsica, Sicily, Servia, Turkey, Roumania, the Faroe Islands.

But far below these have been a very large number of native populations, especially in tropical countries, where the cancer rate has been so small that many medical officers have never seen a case, or, where there have been hospitals, only one-tenth to less than one-hundredth of the European hospital proportion has occurred among persons coming for treatment.

The countries of immunity, or where cancer has been rare, were—most of Northern, Central, West, East, and South Africa, where natives were apart from civilisation or European customs; a large part of Asia, especially the tropical regions, where habits were frugal, or where certain peculiar customs were not prevalent; large parts of India, China, Burmah, and Siam; many of the Islands, especially New Guinea and Borneo; the native locations in Australia; the Fiji Islands, parts of the West Indies; parts of Brazil and of Mexico; and apparently native Java and Sumatra.

Exceptionally, in Africa, Abyssinia has had a rather high or moderate rate, also Uganda and part of the Soudan.[1] And exceptionally for Asia, Tibet appears to have a very high rate for cancerous tumours.[2] Abyssinia is a country of flesh-eating and beer, Uganda also differs from most of Africa in its flesh-eating and beer-drinking, and in parts of the Soudan flesh and beer are largely used. Tibet is remarkable for its flesh and tea eating; the tea is a staple of diet, mixed with butter. In these countries food is eaten very hot.

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[1] See Appendix I.

[2] *Ibid.*

In North America the highest rates have been in the richest northern parts, the lower rates in the poorer southern parts. In Mexico the lower tropical parts have had much less of the disease than the high cold regions. In South America, Brazil has had a very much lower rate than Argentina and Uruguay, where habits are carnivorous and luxurious.

The rates for Greenland, Iceland, and the Faroe Islands, where raw flesh, bear's fat, or fish is a staple, appear to have been low, but statistics are wanting.

In England the highest rates have been in rich and residential districts, the lowest in industrial and mining districts; but the agricultural counties of Wilts, Bucks, and Dorsetshire had rates below the average for the whole country; this refers to the years 1881–90, and to persons of thirty-five and more.

The area of special cancer prevalence included Bourn, Stamford, Spalding, Holbeach, Oundle, Peterborough, Hunts, and Cambridgeshire in two successive decennial periods. The corrected rates showed London to be highest of all (including the excess owing to hospitals); then came Hunts, Cambridgeshire, Sussex, and North Wales. Devonshire and Norfolk were low, Monmouth and Derbyshire lowest, with Dorsetshire, Wilts, and Cornwall. (*Supplement to the 55th Report of the Registrar-General*, Part I.) We may here observe that the hard water and calcareous formations of Derbyshire do not seem to have had a bad influence.

The mortality of Scotland for cancer was highest in Berwickshire, Nairnshire, and other prosperous counties, and in Edinburgh; lowest in the poor counties and islands.

The mortality of Ireland was below that of England, in spite of the much higher average age, and was very low in the poor counties of the West and South, very high in the rich districts of the North and East. The rate for Kerry was 260, for Armagh 1040, for Mayo 364, for Meath 706, for Dublin 848.

In France the lowest rates were in the poor and frugal provinces of Brittany and the Mediterranean Coast, and in Corsica; highest in Paris and its environs, Normandy, and in a strip from the Pas de Calais to the Bay of Biscay. The beer and cider drinking districts had a much higher rate than the districts of wines and spirits.

In Brittany the peasant class had a low rate for France. They lived on coarse brown bread and cakes of sarassin; they did not eat flesh. When these people came to Jersey they worked on farms, where they were fed on boiled salt pork, vegetables, and tea, which they drank six or seven times a day. Many of them died of cancer in the island.

In Dr. Bertillon's paper[1] on the comparative numbers of inherited properties in different parts of France, I find a general correspondence between the high cancer departments and the high inheritance departments; thus portions of Normandy and the country surrounding Paris show a high figure for inheritance and are highest in cancer rates. But the conditions affecting the number of inheritances are various, and the correspondence is only a general one, rather striking especially in the maxima and minima, as shown in Dr. Bertillon's chart illustrating his article. Among his conclusions are the following: The Department of the Seine is the centre of the riches of France. The proportion of proprietors is small in the districts with the Italian patois (Còrée, Alpes Maritimes), and in Corrèze, Haute Vienne, and Dordogne in the centre and some other Departments, Finistère, Landes, Alpes, the two Savoys, Hautes and Basses Alpes and Var.

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[1] "Statistique des Successions en France," *Bulletin de l'Institut International de Statistique,* 1909. Par Jacques Bertillon.

I have lately heard from Dr. Bertillon (Jan. 23, 1912) that he is struck by the relation of the riches of a country and the frequency of cancer, and that I shall find in his article arguments in favour of my thesis.[1] That it is certain that the fatal section (*carré*) contains the richest part of France. Lyons, very cancerous although outside the fatal section, is a very rich town. On the other hand, he notes that in France the frequency of the disease does not appear greater in the rich than in the poor quarters of the same town. This is exhibited in a table which he has extracted for me, giving the mortality of persons over 60 per 100,000. The very rich quarter of the Elysée has for these ages a mortality of 4070 per million, and the very poor quarters of Gobelins, Montmartre, Buttes Chaumont, and Ménilmontant have each a mortality ranging from 6470 to 7380. These differences seem to me very remarkable, and are rather contrary to English experience in towns. They may depend on drinking habits and the large consumption of excessively damaging liquors, such as absinthe, which causes so much disease, insanity, and crime that Switzerland has prohibited its sale. Absinthe and other harmful liquors are largely drunk in the environs of Paris, where the rate is excessive. The habits of many of the richer people, on the other hand, rather favour frugality and dainty dishes.

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[1] "Je suis très frappé par la comparaison que vous faites entre la richesse d'un pays et la fréquence du Cancer. Vous trouverez dans mon article des arguments pour votre thèse."

According to recent information which I have received, in many parts of Normandy very large quantities of so-called cider are habitually drunk, containing an extraordinary proportion (over 80 per cent. in some cases) of pernicious forms of alcohol. In villages enormous quantities of such compounds are imbibed to the detriment of the people, and it may be that these drinks contribute largely to the unusual number of deaths from cancer in those parts.

In the official Reports on Industrial Conditions in 1871 it was stated that in Paris bread, vegetables, pork, sardines, various meats, eggs, fruit, red wine, black coffee, and absinthe were the common fare. The richer classes had only two solid meals a day. The fish or meat was small in quantity compared with the vegetables. Alcoholic drinks and black coffee affected the nerves of many people. In Normandy cider was much drunk; in Brittany cold water, cold tea, spirits, and cider. At Brest the fare was bacon, bread, butter, coffee, and soup. At Cherbourg and at Rouen much cider was drunk.

It may be pertinent to mention that in Paris the deaths from diabetes have increased at a remarkable rate in recent years, as the following figures show:—

1880.	1890.	1900.	1908.	1909.
128	304	427	464	525

The habits of most classes must have gone rapidly on the down grade in an alimentary sense, but the poorer and industrial classes are much subject to the effects of adulterated and poisonous liquors, for which in French towns there are very ample facilities of sale.

In some of the main streets of Cherbourg, for instance, nearly every other shop sells liquor. Travellers in France in the course of the last thirty years have noticed a change in the quality of the coffee; during the last decade the coffee throughout the country has had a rasping acridity. Liqueurs are often drunk in addition to other drinks taken during and after meals.

Dr. Le Goff has stated, in relation to diabetes, that "the fault is not so much one of overfeeding as of ill-combined and ill-adapted foods, insufficient mastication, and other causes that favour alimentary auto-intoxication."[1]

Dr. Alexander Silver has given in *Quain's Dictionary* a list of articles which produce or aggravate the disease. Sugar must be avoided, and all substances containing sugar. The objectionable solid foods include starchy matter, most fruits, haricot beans and peas, potatoes, carrots, and many other vegetables; the harmful drinks are brandy, most wines, such as port and sherry, all sweetened liquids, gingerbeer, lemonade, champagne, sweet beer, cider, porter, rum, and gin.

It seems not unlikely that the largely increased consumption of sweet things by children and adults many times a day may have increased the prevalence of diabetes.

The mean annual number of deaths from cancer in Belgium from 1851 to 1860 was put at 1237; from 1861 to 1869 it was 1620.[2] In 1905 the number was put at 4203. In 1909 it was 4786. But I find that the number of deaths from unspecified or ill-defined causes was, in 1905, 5684, and in 1909, 4960; and that from "other causes" than those specified in the list referring to these years the number was 18,818 in 1905, and 15,846 in 1909. In 1861 to 1869 the number from "other causes" had been 17,844.

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[1] *Lancet*, April 8, 1911.

[2] *Annuaire Statistique de la Belgique*, 1910. See pp. 120 and 123. Imprimerie A. Lesigne, 27 Rue de la Charité, Bruxelles.

From 1846 to 1900 the population grew from 4,337,196 to 6,693,548, an increase of over 30 per cent.

I think the population in 1905 would have been about 7,000,000, and in 1909, the last year giving cancer mortality figures, about 7,250,000, since, as shown on p. 13 of the Belgian Report, population has grown at the rate of 10·28 per cent. in the ten years 1890–1900. From this we calculate a cancer mortality in 1909 of about 660 per million. The "unspecified" and the "other causes" much qualify this figure, which is certainly too low.

In a book just published, "The Belgians at Home," by Clive Holland, it is stated that the Belgians live considerably more simply and lightly than those of the same class at home.

In Germany there was a remarkable difference between the poor districts of the east bordering on Poland, and the more prosperous provinces of the west.

The largest beer-consuming States had the highest rates of all—among the highest in Europe.

A table was quoted by the *British Medical Journal* in 1904 (July), showing the cancer death-rates during the period 1892–1900 for persons of 60 years and over per 100,000; as follows:—

German Empire	416·3	Alsace-Lorraine	499·3
Baden	561·0	Würtemberg	463·9
Saxony	647·0	Prussia	331·0
Hesse	624·0	Saxe-Coburg-Gotha	256·8
Bavaria	553·6		

In Austria the mortality was very much higher in the prosperous provinces than in the poor; Salzburg, a very large—perhaps the largest—beer-consuming district, having a rate of 1330 against the 190 of the poor and more Italian provinces of Dalmatia. In the *Oesterreichisches Statistiches Handbuch,* 1909, it is observed that Servia was very low, 19·2, compared with Salzburg, 60·2; that the rate of Görz and Gradiska was only 20·4, and of Krach 20·2.

In Italy, prosperous Tuscany had a rate of 830, Emilia had 780, and Lombardy 710 against Calabria, 300, and Sardinia 190. Florence had the extraordinary rate of 1370 against Naples with 560.

In Switzerland the rate was highest in Lucerne, 2040; lowest in Valais. These are respectively about the richest and poorest districts. The Lucerne and Schwyz cantons are in the far east of Switzerland, and rather German in character; beer and cider are the popular beverages. Valais is much affected by goitre. The Swiss figures, which are the highest for any European country, include tumours, but I cannot find that this makes any large difference in the result. The population has rapidly grown from penury to comfort in the last sixty years, and now includes a large number of foreign visitors. The distributed prosperity is about the highest in Europe. Dr. Kohl has shown in a very interesting paper[1] that the corrected mortality rate for cancer, in the period 1871–1890, varied from 706 in Tessin to 1722 in Lucerne, 1853 in Schwyz, and 2095 in Appenzell innere Rhoden. On looking at his charts, one is very much struck by the excessive prevalence in the central parts and the much less prevalence in the Italian cantons. Tessin is on the Italian side; Appenzell in the east, on the German side. The lower incidence which belongs to Italy seems to extend to the Italian parts of Switzerland. In the canton of Graubunden, which was the special subject of the monograph, the Italian district of Bernina had a mortality of 953, and the neighbouring Maloja, which is "romanisch," had 1737.

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[1] "On the Distribution of Cancer in Graubunden Canton."

In an article in the *Nineteenth Century and After*, June 1903, "The Increase of Cancer," Dr. Alfred Wolff adduced several particulars showing the connection of cancer with beer-drinking.

In France, Germany, and Austria all districts with a high cancer rate are where beer or cider is largely consumed. Bavarians consumed more beer than any other State in the world, except Belgium.

Salzburg had the largest beer consumption of all Austrian provinces.

In France the districts where beer or "cider" was drunk had the highest rate for cancer.

The rates per million were as follows:—

Eure et Loire	1670	Seine outside Paris	1500
L'Aisne	1620	Seine Inférieure	1490
Rhone	1530	Marne	1430
Seine et Oise	1500		

Rouen and Lille both had extremely high cancer rates, and are large consumers of cider or beer.

On the other hand, I think that evidence that pure beer of every kind has this effect is not complete. Munich beer, lager beer, and much English beer have highly pernicious ingredients, often including much salt and a little arsenic. Beer induces heart disease and rheumatism. The cancer rate of Belgium, if correctly made out, is low for Western Europe; yet Belgium has much the largest consumption of beer per head of all countries. Of coffee and flesh, the Belgian consumption was not very high.

In a Memorandum of the Board of Trade on Consumption of Alcoholic Beverages in Europe (1902), it appears that Roumania, Servia, and Bulgaria used *very small* quantities of beer, and not much wine or spirits; Hungary only 7 litres of beer against Austria's 70 in 1901-2. Italy consumed about 7. Spain and Portugal consume much more—60 to 100 litres per head per annum. According to Dr. Wolff:—

In Bavaria the cancer rate (in 1900) was			. .	1020
Baden	,,	,,	,, . .	1020
Saxony	,,	,,	,, . .	947
Würtemberg	,,	,,	,, . .	940
Hesse	,,	,,	,, . .	954
Salzburg	,,	,,	,, . .	1330
Upper Austria	,,	,,	,, . .	1150
Carinthia	,,	,,	,, . .	926
Bohemia	,,	,,	,, . .	918

Bavaria, Baden, and Würtemberg had the largest consumption of beer in Germany.

The wooded parts of Brunswick had a high cancer mortality.

In the United States the south Mississippi River belt had a rate of 110, the south-west central region 150, and the southern interior plateau 180, against rates in the northern and eastern States between 400 and 500 or more.

The comparative immunity of Africans and Chinese is real, and not only apparent; this is testified to by many excellent observers. Thus Dr. Hearsey reports from Zomba, British Central Africa: "No difficulties were encountered by medical officers in endeavouring to discover cases in aborigines. There can be no doubt that cancer as a disease affecting natives of British

Central Africa is a disease of the utmost rarity." The principal medical officer at Hong-kong reported that "The hypothesis that malignant disease is rare in these races because such a small number attain ages exceeding forty-five does not apply to the Chinese in Hong-kong." 712 out of 5882 Chinese who died in Hong-kong in 1904 were over sixty. Hong-kong, we must remember, is a very unfavourable specimen of China, being a treaty port full of immigrants, and infected with European vices and Chinese perverted customs of eating and drinking.

As regards Egypt, Professor Madden observed, and other medical men agreed, that cancer was not found among the black races, the Berberines, and Sudanese, who lived almost entirely on a vegetable diet. It is rather common among the Arabs and Copts, who live and eat much more like Europeans.

Among the natives of the Sierra Leone country cancer is very rare, but occurs among those coloured descendants of liberated natives who adopt the European ways of living and eat much flesh.[1] In Dr. Renner's time there was no case in the whole register among natives living in their own way.

In New Guinea Dr. A. Craigen, during his four years' stay, saw no case among the natives, but Europeans there were not exempt.

A letter of Dr. Renner of Freetown, West Africa, January 14, 1911,[2] quoted his own report for 1900:—"'Cases of cancer occur among the Creoles or descendants of liberated Africans, who have adopted the European mode of living, and consumed a large quantity of butcher's meat.'

"In the whole register there is not a single case recorded against the liberated Africans themselves, and this record deals with the years 1870 and 1879.

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[1] Dr. Renner.

[2] *British Medical Journal*, January 14, 1911.

"For the year 1910, 8 cases were recorded; for the period 1900–1910 a total of 30.

"These cases have occurred in the Creoles or Sierra Leoneans."

Dr. Langley, Principal Medical Officer, in the Government *Annual Medical Report* for 1908, stated: "Cases rarely come under the notice of medical officers, although the occurrence of such is carefully watched with a view of obtaining information for the Cancer Research Committee. No pathological specimens have been obtainable; 1 case and 1 death were reported during the year. Thus the 47 medical officers, distributed in the chief towns and centres, only found 2, although on the lookout for cases.

"Drinking habits have taken a great hold of the Accras and other tribes."

In contrast to the habits of the West Africans and their immunity from cancer may be set the habits and liability to cancer of some of the great East African populations. The records of accurate observers are most instructive,[1] and I have been particularly struck by the experience of Mr. Roscoe, related in his book on the Baganda (people of Uganda), and of Rudolf Slatin Pasha, C.B., and Colonel Wingate, C.B., D.S.O., R.A., in their book, "Fire and Sword in the Soudan." Dr. Neumann's story of his captivity has also some passages bearing on the habits of the natives. It is clear that animal flesh, brandy, and especially native beer are common articles of consumption with large numbers of the people, especially the well-to-do, in spite of the Prophet's injunctions. Beer is drunk in large quantities. The health and morals of the natives have become degraded. Abyssinia, Uganda, and parts of the Soudan have a high rate of cancer compared with other parts of Africa. In fact, this may be called the peculiar cancer region of that continent.

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[1] See Appendix I.

In Ceylon, among the comparatively small number of cases for a large population, 42 per cent. of all cases were in the parts connected with mastication. This liability was many years ago recognised as due to the chewing of an irritant composition, which many victims have been in the habit of retaining in their mouths for hours.

At the Changpoo Hospital, South China, Dr. J. Preston Maxwell noted an entire absence of cancer of the bowels. The people live on rice mostly; they use little flesh or alcohol. There were 54 cases of cancer, many external, during three and a half years.

At Adampore Dr. A. B. Dalgetty had 8 cases of cancer out of 12,000 people in five years. No case of mammary malignant disease was seen in a native. The women wear a loose dress without any pressure, and the people keep their skins oiled. The mothers nurse their children fifteen months or more.

In the *Victorian Yearbook* for 1909–10, it appears that cancer of the mouth in 1909 accounted for about sixteen times as many deaths among males as among females. Over one-third of the persons who died of cancer were affected in the stomach or liver.

In Australia the rates, as exhibited by Dr. Cooke Adams, show a very large preponderance of cases among the foreign-born, who are placed in new surroundings. Even the Chinese, who have a low rate in their own country, rapidly become subject, and show a rate of over 700. He states that the black people are practically immune. A great number lived to the age period at which cancer chiefly manifests itself, but very little evidence could be obtained of any cases having occurred. The immigrants consume considerably more beer than the white natives, and they have a higher rate of mortality.[1]

On reviewing the incidence of cancer in various countries throughout the world, several facts come out with clearness and emphasis.

1. In all countries the richest portions have been much more subject to cancer than the poorest. This does not apply to all towns, *e.g.* Paris, a very instructive exception.

2. All poor countries, where fare is frugal, and where toxic or hot meats and drinks are little used, were much less subject than rich countries, where these things are largely used.

3. In all countries, except Belgium, where beer is largely drunk there is recorded excessive cancer compared with similar countries, and in all parts of several countries where beer or cider is largely drunk there is an excess, other things being equal.

4. Races and persons little subject to cancer very quickly become subject on entering new conditions where European or American fare is taken. This applies to negroes, Chinese, and apparently all races. Europeans accustomed to their ordinary moderate fare quickly become more subject after they have changed to richer fare.

5. Certain customs appear to be almost entirely or entirely responsible for the production of cancer in particular parts of the body exposed to several kinds of irritation. Without these customs, the malady would be even much rarer than it is in the native races so affected. On the other hand, races exist

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[1] *Lancet*, 1904, vol. i., p. 422, "Cancer in Australia."

which are almost or quite free from cancer of the stomach, which is the seat of a large proportion of cases in Europe and America. These races live on a very simple diet. Examples are such peoples as those North Africans and those Bedouins who live on dates and milk, the Chinese in parts of Southern China, and Hindoos who live on millet or rice without condiments.

In a general way it may be stated that all nations or races habitually using fresh and cool non-toxic foods and drinks are little affected by cancer.

The Japanese, who are much more heavily smitten than the Chinese, are an example of a race rapidly adopting some European habits, and rapidly growing richer, but they have long been accustomed to daily tea-drinking and to daily bathing in water so hot as to be quite unbearable by Europeans. They also include in their meals daikon, a sharp and putrid vegetable.

II

THE GENERAL INCREASE OF CANCER

It has been and is contended by several eminent investigators that cancer has not really increased, but that the recorded increase has been apparent only, and has been owing to better diagnosis, better registration, difference in classification, survival to later ages, and other factors.

Let us look at the evidence.

In England and Wales the record is as follows :—

1840	177	1880	502
1850	279	1885	572
1855	319	1890	676
1860	343	1895	755
1865	372	1900	828
1870	424	1905	885
1875	471		

The Registrar-General pointed out, in the Report on the mortality of England and Wales for 1881–90, that the death-rate from cancer had risen from 384 per million living of all ages in 1861–70 to 468 in 1871–80 and to 589 in 1881–90, and that this rise was partly accounted for by the transference during 1885–90 of a considerable number of deaths from other groups to this. Also some increase was accounted for by improved methods of diagnosis. The rise, however, continued subsequently, and in the following decade, 1891–1900, the number was 828.

The Editor of the *Royal Statistical Society's Transactions,* in a note on Mr. Roger Williams' paper in *The Lancet,* observed that Dr. Ogle, in his letter prefixed to the Forty-fifth Report of the Registrar-General, suggests that the increase of cancer among males may be accounted for by better diagnosis. This was in 1885. About ten years later his successor noted that of 2946 deaths attributed to tumour in the ten preceding years, 1246 came eventually to be classed as cancer. On this I would observe that if the small number, equal to about 125 cases each year, be added to the yearly figures for cancer in the earlier years of the decade, it would only slightly reduce the recorded increase during that period.

Dr. Stevenson's Report to the Registrar-General for 1908 stated that the cancer mortality for males increased in that year at every age at which cancer is an important cause of death. The most rapid increase was in males. In the eight years' period ending 1908, the mortality of males was 738 per million, compared with 579 for females, excluding the generative and mammary organs.

In 1902, the Registrar-General, noticing the steady increase for many years, wrote that "at each of the six age-groups under thirty-five years (of age) the registered mortality from malignant disease is increasing, and that not slowly."

In the Registrar-General's Report for England for 1845 the following are the rates given for the years 1838 to 1842 per million living:—

	1838.	1839.	1840.	1841.	1842.
Cancer	166	128	181	176	186
Tumour	25	25	18	18	18
	191	153	199	194	204

Dr. Newsholme, in his *Vital Statistics*, observed that (p. 246): "The curve of the Scottish Widows' Fund Office has the easiest gradient of all, strongly confirming the view that the apparent increase of cancer mortality is caused by increased accuracy of diagnosis and certification. Moreover, the curves of male and female mortality tend to approximate, not to widen, as they would, if there were a real increase of cancer."

The Frankfort statistics do not show, he affirmed, such an increase in cancer mortality in any particular part of the body, as might be supposed to account for the continued parallelism of the curves. The Frankfort statistics show that "when cancer cases are divided into accessible, inaccessible, and ill-defined between 1860 and 1889, there has been no increase in mortality from cancer in accessible positions." I will refer to the case of Frankfort later.

The evidence of increase of cancer mortality was deemed altogether insufficient, and in his opinion had probably not occurred. The system of inquiry by the Registrar-General was the means of increasing the cancer death-rate in 1881–90 by 6 per million. The corrected cancer death-rates for England and Ireland are:—

	England.	Ireland.
1860–66	625	614
1867–73	747	661
1874–80	911	699
1881–87	1152	824
1888–90	1393	912

Some striking alterations in the rates of cancer are brought out by this method. The cancer mortality rate per standard million over 35 is found to be for Hunts compared with Durham as 127 to 100, instead of 208 to 100, the crude rate taken for all ages.

For England and Wales (1881–90, *by corrected method*) *per million living over* 35.

1844

Highest Counties, 1881–90.		Lowest Counties, 1881–90.	
Huntingdon	2157	Dorset and Bucks	1578
Cambridgeshire	2012	Derbyshire	1597
Sussex	1999	Wilts	1604
London (including hospitals)	2250	Monmouth	1574
		Cornwall	1630

In the last edition of *Quain's Dictionary*, in an article by Sir Clifford Allbutt, Dr. J. F. Payne, and Sir Rickman Godlee, on cancer, it is observed that the increase of cancer in England has been more rapid in males than in females, and the authors consider that this increase has been largely due to increased frequency in the digestive organs; but that the explanation of the increase by "better diagnosis" would not apply to the last ten years. The actual increase, they proceed, "is now admitted by the heads of the Statistical Departments in England, Scotland, and Ireland." This was written in 1902. There has been quite lately a re-assertion by the Cancer Research Investigators of the merely apparent character of the increase.

It has been argued in various quarters that the apparent increase may be due to better sanitation and hygiene, causing more persons to live beyond middle age. But this would not apply to the increase in every age-group. Moreover, there has, as a matter of fact, been no increase in the proportional number of people living beyond thirty-five in the period 1881–91 compared with previous periods. The saving of life was mainly in persons below twenty years of age. In the *Royal Statistical Society's Transactions* for 1898 it will be found that the general death-rate of males over thirty-five and of females over forty-five remained the same or increased during the period 1840–96. The cancer mortality increased from 177 to 764 per million living. And the increase has involved all or nearly all parts of the body.

In London the cancer death-rate per million has increased, as the following table shows:—

1851–60	470	1881–90	680
1861–70	480	1891–1900	840
1871–80	550	1905	930

In Scotland the reported rate has regularly increased from 416 in 1861–70 to 890 in 1905. The usual qualifications must be applied, as described by the Registrar-General for Scotland.

In Ireland, from 270 in 1864 to 793 in 1906. In Switzerland it has apparently increased, but at a slower rate recently.

In the *Statisque de la Suisse pendant l'Année*, 1909, the following are given as the actual deaths from cancer:—1905, 4202; 1906, 4342; 1907, 4175; 1908, 4387; 1909, 4483; and in the *Journal de Statistique*, in an article, "Die Frequenz und Vertheilung des Krebses in der Schweiz, 1889–1898," Dr. Leon Nencki, of Bremgarten, Bern, shows that there was a rise, with variations in that period, in the proportion of 11·44 to 13·24 per cent. In Saxony, Baden, Prussia, and Switzerland there was a nearly continuous increase, *e.g.*:—

	1891.	1892.	1893.	1894.	1895.	1896.
Prussia . . .	4·5	4·65	4·70	4·88	4·88	5·17
Switzerland . .	11·91	12·39	12·23	12·23	12·85	12·76

In Switzerland more men than women died of cancer. Schwyz and Luzern were highest, Urschweiz high, and Tessin very low.

In a table showing the annual mean of total mortality, tuberculosis, and cancer mortality for ages of forty and over for the period 1902–06, in the cantons and smaller districts of Switzerland, printed by the Bureau Fédéral de Statistique at Bern, the following figures are given, with a note stating that the death causes were medically certified in 99 per cent. of cases in fifteen cantons, in 95 to 98 per cent. in six, in 93 per cent. in one, and in 58 to 86 per cent. in three cantons, these last being Valais, Uri, and Grisons. In Valais canton the uncertified deaths were 42·1 per cent., in Uri canton 19·7.

Allowance must be made for these deficiencies. The cancer rate for Valais is much the lowest, 1700 per million. Valais is about the poorest canton, and borders on Italy. Parts of it are subject to goitre; much of the population is resident in the Rhone and tributary valleys. Tessin is next lowest, also an Italian canton, with 2800. Most of the other cantons have rates between 3700 and 6700. Zug has 6800, Lucerne 5900, Schwyz 6000, Nidwalden 6700. By far the highest is Appenzell innere Rhoden, with 8000. Referring to the chapter in my book on "Strength and Diet," dealing with the diet of races and nations, I find that Mr. Jellinger Symonds, H.M. Inspector of Schools, wrote that the canton of Appenzell presents the maximum of prosperity and contentment among the peasantry of Switzerland. This is a curious corroboration of the common rule respecting the incidence of cancer.

Accounts of Swiss fare recently available, or which I have obtained in Switzerland, agree in stating that flesh, often pickled, and coffee now enter largely into the common fare, in place of the cheaper foods of half a century ago. Sour wine has long been a common drink, and I am told that many peasants' families consume 600 litres during the winter. Many workmen have five meals a day. According to Mr. Story, writing in 1902, drunkenness was one of the worst sins of the country; the alcohol consumed was valued at £4, 8s. per head. But the people in the more pastoral districts lived very simply, seldom eating flesh. In the Schwyz canton, where the cancer rate is high, the people used to live on vegetable products, milk, and cheese. In this and in Lucerne canton much beer, spirits, and sour cider is drunk.

From a very competent authority I have just received the following information:—

"In the town of Lucerne beer and wine are drunk at the restaurants, and smaller quantities at home. Cider is also consumed by the middle and labouring classes in public-houses and at home, but in a less amount than beer. In the country cider is the national drink, but beer and wine are also drunk, especially in the restaurants.

"In the cantons of Schwyz and Appenzell the common drink at home is cider, but less is drunk than in Lucerne canton. In the restaurants beer and wine are drunk. In the canton of Schwyz a great number of people regularly drink black coffee, sometimes with brandy."

Referring to the Reports on the Industrial Conditions of Foreign Countries, furnished officially in 1872, it appears that the amount of meat eaten in Switzerland was even then large in many cantons. In Fribourg it was 60½ lbs. per head in 1871. In Tessin, polenta largely replaced bread. In most parts "the lower orders are hard drinkers." Wine, sour cider, brandy, coffee, flesh, and cheese were common fare.

In January 1912 I obtained the following actual mortality figures for Switzerland from the *Statistiches Jahrbuch der Schweiz* in the volumes for the last seven years at the Cantonal Library of Lausanne. The figures refer to towns and their districts, and are placed under the heading of carcinoma :—

Towns.	Population in 1909.	1904 Mortality.	1908.	1909.	Mean of the three years, per Million Living.
Zürich	183,650	175	156	221	1000 (about)
Basel	128,691	101	124	155	980 „
Geneva	120,063	145	133	149	1178 „
Bern	82,284	72	87	83	978 „
Lausanne	61,490	60	50	47	856 „
St. Gallen	57,415	60	85	86	1160 „
Chaux de Fonds .	37,400	40	34	39	1005 „
Luzern	37,750	30	49	60	1230 „
Winterthur . . .	24,679	29	39	34	1370 „
Biel	23,361	22	36	22	1130 „
Locle	12,677	15	13	7	915 „
Vevey	13,339	22	21	5	1040 „

The figures in the last column I have myself calculated from the data.

It will be observed that in some towns there has been a decrease from 1904 to 1909. It is possible that this may be connected with a vigorous "anti-alcoolique" movement which has, from what I hear, affected these districts. There are also factors such as the large increase of young people in schools at Lausanne, and the increase of Italian workmen employed in building. But the following table shows an increase in Switzerland as a whole, even if the considerable increase in population be taken into account:—

Deaths from Carcinoma in 18 *Towns with over* 10,000 *Inhabitants*

1902	856	1906	938
1903	888	1907	907
1904	861	1908	970
1905	950	1909	1025

The Bureau Général de Statistique for Switzerland has set forth in a paper, a copy of which was kindly sent to me, the site incidence for the five years 1905–1909:—

Out of 2124 cases among men in 1905, 1047 were in the stomach, and out of 2178 in women, 873 were so situated. A similar proportion held in the four following years. The cases of lip cancer were fully five times as numerous in men as in women, and of the tongue fully ten times; and of the larynx, parotid gland, and pharynx, fully seven times. On the other hand, the face was more frequently attacked in women. It is remarkable that the cases in the liver were largely in excess among women. The total mortality of men and of women from the disease in the five years was almost exactly equal.

Dr. H. Häberlin contributed a study on the distribution of gastric cancer in Switzerland to a German medical periodical in 1889.[1] He quoted Griesinger, who had seen none of it in Egypt, and Herzmann, who noted its absence in Vera Cruz, and observed that in Turkey and the tropics it is said to be rare. Bräutigam of Wurzburg found a mortality from gastric cancer there of 0·39 per mille in 1877. Dr. Espine in Geneva Canton, during 1843–1845, found 0·27 per mille; Nedopil, in Vienna, 0·20 per mille; and Prussian statistics gave an estimate of 0·22 in 1878.

In Switzerland the male mortality rose from 0·37 in 1877 to 0·61 in 1886. There were registration changes which might partly have accounted for this rise. Still, by taking the proportion of gastric cancer deaths to total deaths, there is shown a rise of from 1·5 in 1877 to 2·8 in 1886.

Häberlin concludes that there has been a large actual rise in the disease in males.

In 1877–1886 the highest proportion to all deaths was found in the Canton Appenzell innere Rhoden, 3·4; the next was in Thurgau, then in Glarus, Luzern, and St. Gallen. The lowest was in Tessin, 0·8, and in Baselland, 1·1.

Häberlin attached importance to the influence of food and drink. Autenrieth imputed to the excessive diet of the people around the Lake of Constance (Boden See) the prevalence of cancer among them. They used much sour food and drink. Cloquet attributed the excess in Normandy to cider.

Häberlin did not consider the small difference in meals of much influence as between East and West Switzerland, but thought that the very sour wines, and possibly the cider of East Switzerland, may have an effect in determining the occurrence of cancer and so producing its higher mortality. It is a saying among some of the peasantry who drink this sour wine, that after drinking it at night one should turn in bed so that the acid shall not eat into the stomach walls. The "most" or fermented stuff from rotten apples also causes much gastric disturbance with many people.

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[1] "Über Verbreitung des Magenkrebses," *Deutsches A. für Klin. Med.* xliv. 461, 1889. By H. Häberlin, Assistenarzt der gebürtshülflich-gynäkologischen Klinik. Zürich.

The paper concluded:—

1. Gastric cancer in Switzerland attained to double the rate of Berlin and Vienna.
2. There was a large increase in the period 1877–1886.
3. In north-east Switzerland it was most frequent; in the southern cantons at a minimum.
4. In males the proportion to all cancers was 51·8 per cent.
5. Cider and sour wines increase the disposition to cancer.
6. It is probable that carcinoma develops on the soil of chronic gastritis.
7. The bad condition of the teeth is responsible for a part of the great mortality from gastric cancer.

These observations accord with many others which tend to connect a rheumatic condition, and a daily fare causing rheumatism, with predisposition to cancer.

Increases have also taken place in Denmark, France, Sweden, Norway, Holland, Germany, Austria, Hungary, Italy, America, and Australia—in fact, in nearly all countries from which data are obtainable. In many countries it has doubled or trebled. In Norway it has more than doubled during the twenty years 1880–1900, in Holland it has doubled in thirty-five years, in Australia it has nearly doubled in thirty years in several provinces.

Increases per 100,000 living in the several countries named have taken place as follows:—

Germany	59 in 1872 to 71 in 1900
Berlin	57 in 1870–82 to 109 in 1899
Bavaria	56 in 1880 to 98 in 1900
Austria	37 in 1880 to 70 in 1900
Italy[1]	21 in 1880 to 52 in 1899
Saxony	69 in 1876–85 to 95 in 1900
Prussia	31 in 1881 to 59 in 1900
France (towns)	76 in 1887 to 106 in 1900
Sweden	80 in 1875–79 to 102 in 1900
Denmark	109 in 1886–7 to 130 in 1900

In the Fourth Report of the Registrar-General for Scotland, 1858, it is stated that in 1858 there died of cancer twenty-two males and forty-three females in each 100,000 of each sex. In 1859 the record for the five previous years showed that twenty-two males and forty-four females died of cancer in each 100,000.

In the Report of the Registrar-General for Scotland, 1909, the deaths were 102 per 100,000. The most frequently specified sites among males were: stomach 510 cases, liver 212, intestine 203, rectum 126, tongue 93, and œsophagus 88.

In the Supplement to the Twenty-fifth Report of the Registrar-General the deaths from cancer for the period 1851–60 in proportion to a million living (supposed) at the ages named were as follows:—

	Males.	Females.
At 55–65	931	1853
At 65–75	1504	2351
At 75–85	1734	2353
At 85 and over	1860	2259

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[1] Meat consumption smallest of any of these European nations: 23 lbs. in 1899, per head.

In the Supplement to the Forty-fifth Report the following were stated to be the numbers of persons who died from cancer per million persons living:—

	Persons.	Males.	Females.
1851–60	317	195	434
1861–70	387	244	523
1871–80	473	315	622

The following particulars are derived from Adami's great work on the "Principles of Pathology" (p. 839).

In San Francisco the relative number of deaths from cancer increased by seven times in thirty-two years, from 165 in 1866 to 1036 in 1898.

In Boston the rate trebled between 1863 and 1887. In New York State the mortality in 1887 was 2363, in 1898 it was 4456.

According to Tatham (*Lancet*, 1902), the annual English rate in 1861–70 was in males 242; in 1891–1900 it was 597, an increase of 150 per cent. In females the increase was 74 per cent.

Würtzdorff's statistics for Germany are equally remarkable. Of deaths in hospitals in 1879, 6330 were attributed to cancer; in 1898, 24,000. The corrected increase is 266 per cent.

"Nor is it that nowadays more cases are correctly diagnosticated than formerly; the post-mortem statistics of certain old-established hospitals reveal an increasing ratio of cases found to be cancerous; this in different parts of the world." (See Barlow and Taylor on St. George's and Middlesex Hospitals.)

In the United States Census Report for 1900 to 1904 the average cancer mortality for the period was found to be 666 per million living. The sites of the cases were as follows:—

Mouth	19	Breast	54
Stomach and liver	241	Skin	22
Intestines	62·7	Other parts	166
Female genitals	193		

The cases in the mouth increased from 16 per million in 1900 to 18 in 1902, and to 22 in 1904. The following were the increases in several sites:—

	1900.	1901.	1902.	1903.	1904.
Stomach	225	227	235	253	265
Intestines	57	69	70	66	73
Breast	47	53	55	55	62
Skin	20	22	22	23	23

United States Mortality Statistics, 1907

In the Mortality Statistics of the United States for 1907, the deaths from cancer per million living are given as follows:—

1900	630	1903–04	706
1900–01	645	1904–05	721
1901–02	653	1905–06	708
1902–03	686	1906–07	731

Increase, 1900–07 . . . 101

"The reported mortality from cancer is steadily increasing" (p. 62).

"It is likely also that many of the deaths from tumour are in reality due to malignant tumours or cancers."

"The great preponderance of cancer of the stomach and liver is very apparent," "nearly two out of five of all cases." The proportion in males only would be much higher.

There are various qualifications and considerations as to the organs reported which should be borne in mind, but probably the reported cases give a fair idea of the incidence in any large number of cases.

Deaths from cancer in certain sites were reported as follows:—

Annual Average

	1901–5.	1903.	1904.	1905.	1906.	1907.
In the mouth . .	677	661	737	792	941	968
In stomach and liver	8091	8193	8744	8939	10946	11596

In both of these parts the number of cases is evidently much larger than the number would have been without an actual increase of the disease, counting for increase of population.

The report gives the total deaths per million from cancer in the United States and other countries as follows:—

	1901–5.	1903.	1904.	1905.	1906.
United States .	683	686	706	721	708
Belgium . . .	578	585	561	587	...
Ceylon	56	57	50	53	46
Chile	...	279	...	286	...
German Empire	777	774	800	809	...
Prussia . . .	654	652	686	694	704
Hungary . . .	388	391	406	402	404
Japan	536	...	...	559	...
Netherlands . .	974	990	979	1012	1007
Servia	97	91	103	104	106
Spain	447	442	468	468	480
Switzerland . .	1297	1310	1303	1318	...

Häberlin has pointed out that gastric cancer is steadily increasing (vol. viii., p. 242).[1] Per million inhabitants of Switzerland, there was a death-rate from cancer of the stomach as follows:—

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[1] *Twentieth Century Practice: An International Encyclopædia of Modern Medical Science.* 20 vols. Edited by T. L. Stedman. New York, 1897.

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
610	660	720	770	850	870	850	840	900	990

And according to Dr. J. D. Bryant of New York, in the United States, it was per million:—

1850.	1860.	1870.	1880.	1890.
90	117	160	260	335

In the Report of the English Registrar for 1889 there is a comparison of site incidence in 1868 and 1888:

Males.			Females.		
	Per 100 Deaths from Malignant Disease.			Per 100 Deaths from Malignant Disease.	
	1868.	1888.		1868.	1888.
Stomach . .	35·3	24·0	Uterus . . .	38·0	31·4
Liver . . .	12·0	14·9	Breast . . .	24·2	18·3
Tongue and mouth . .	8·0	7·2	Stomach . .	11·9	11·9
Rectum . .	7·8	8·9	Liver and gall bladder . .	6·4	12·7
Intestine . .	4·0	6·6	Rectum . .	3·7	4·8
Face . . .	6·3	3·2	Intestine . .	2·1	5·3
All others . .	26·6	35·5	All others . .	13·7	15·6

There is less increase in cancer of the stomach than in other sites, especially in males.

The increase for males was 22 per cent., for females 44 per cent., but the increased death-rate from cancer in all sites was 50 per cent.

D'Espine's statistics for Geneva in 1838–55 showed

63 per cent. of cancers to be in the digestive system and Virchow found 50·5 per cent. to be so situated. The Registrar-General of England found the proportion to be 49 per cent. in 1900.

Dr. Tatham's analysis for 1897 and 1900 showed also that there was no increase of those growths which were in positions described as inaccessible.

In the Report for 1909 the Registrar-General observed that, compared with the preceding quinquennium, the mortality in each sex exhibited an appreciable increase in 1909 at every age-period at which cancer is an important cause of death, except the earliest, 35–45.

That cancer of the stomach among males is not only the most important but the most rapidly growing form. Its apparent increase may to some extent be due to transference from the liver, the next commonest site in males. Cancer of the liver shows little increase in recent years.

That in females cancer of the uterus shows little or no increase during the thirteen years, but the mortality from mammary cancer was increased by about 28 per cent., notwithstanding lives saved by improved methods of operation. For women the mortality from cancer of the intestines has practically doubled during the last thirteen years. "Doubtless this is very largely due to improved diagnosis." The increase among males of cancer of the jaw and especially of the tongue has increased by 228 per cent. in forty-one years. The increase is entirely confined to males. This seems to the present writer to point to some connection with the habit of smoking, which has more than doubled during the period.

Cancer of the œsophagus was nearly equal in both sexes in 1868, but now it would seem to be over three times as frequent in males as in females. This alteration in sex ratio also applies to the tongue, mouth, and jaw, but not to the stomach, intestines, and rectum. These increases may also have some connection with smoking, which in excess is known to weaken, paralyse, or irritate the upper passages.

In Denmark, with a general increase of cancer, cancer of the breast rose from 32 in 1892 to 66 in 1897; this was more than the rate for internal cancer.[1]

Dr. F. L. Hoffmann, Statistician to the Prudential Assurance Company of America, has found that in Rhode Island, during the period 1876–80 to 1896–1900, cancer of the breast among women increased by 115 per cent.; in Philadelphia it increased by 179 per cent.[2] It is hardly possible to see anything but a real increase in these cases. Inaccessibility and altered age distribution are not factors.

Häberlin's statistics for all Switzerland show a death-rate from cancer of the stomach of 3 per cent. for Northern, 1·5 for Western, and 1 per cent. for Southern Cantons.

Osler and M'Crae, in an article on "Cancer of the Stomach," in their great work "A System of Medicine," state that about half of all cancers arise in the stomach. One million hospital *admissions* showed 4700 gastric cancers, equal to 0·47 per cent. In 50,000 autopsies, 4 per cent. of *all* cases were of gastric cancer.

Reiche's Hamburg Statistics show (1872 to 1895) that 50·2 of all cancers are gastric; 75 to 85 per cent. of all cancers are in the intestinal tract.

Combined statistics of 70,000 cancer cases show over 21,000 as gastric, 33 per cent. Cancer of the stomach is increasing in frequency, or is being more often recognised by better methods of diagnosis.

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[1] Clemow's *Geography of Disease.*

[2] *Journal of the American Medical Association*, October 19, 1901.

Gastric cancer is much less common in negroes; in New York to the extent of one-third.

Griesinger states that he never saw cancer of the stomach in Egypt. Heinemann saw only one case at Vera Cruz in six years. The remarkable differences in prevalence and other considerations prove, I think, that this form depends very largely on ways of living, and is absent apparently where irritative matter is not ingested, as cancer in the mouth is absent among the Cingalese where betel composition is not chewed or kept in the mouth.

Dr. G. Cooke Adams, whose paper was given in the *Lancet*, studied the incidence of cancer in Australia during his residence there. The rate was highest in Victoria, and there was a steady increase from 1870 to 1900. The Chinese showed a low rate compared with Australian whites. (The rate for Chinese in Australia has, however, greatly exceeded the ordinary rate in China.) Native Australian blacks were practically immune. Cancer was to some degree proportionate to the amount of beer drunk, and for this reason the towns showed a higher rate than the country.[1]

In an article on "Cancer of the Uterus," by Dr. John G. Clark, it is stated that Ekblon has made a study of statistics of cancer in the small Swedish town of Fellingsbro. Cancer increased from 21 per million living in the first decade to 1180 in the last decade of the century.[2] This can hardly, however, be taken as more than a small addition to the evidence showing a great increase in Sweden as a whole.

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[1] *Lancet*, Feb. 13, 1904.

[2] From *Progressive Medicine*, edited by H. A. Hare.

The German Life Assurance Company shows that between 1885 and 1889 the cancer mortality was 3·7 per cent. of all deaths; for women the rate was 11·4. From 1889–1895 the rates were 11·4 for all, and 12·9 for women. These figures seem to require elucidation.

The Etna Life Insurance of Hartford showed 2·6 per cent. in 1870, 7·3 in 1906.

In twenty-eight cities of the United States the rate per million living in 1883 was 485, in 1895 it was 587, in 1907 it was 773.

Dr. G. B. Massey, of Philadelphia, in a "valuable critical" (*Lancet*, March 10, 1900) examination of United States statistics,[1] found that in the twenty-eight years, 1870–1898, the cancer rate had been nearly doubled in the seven great American cities; the rise was from 35·4 to 66·4 per 100,000. About 100,000 persons were always suffering from the disease. The rate for San Francisco rose from 16·5 in 1866 to 103·6 in 1898.

It is remarkable that the increase of cancer takes place at a much accelerated rate in towns, especially in America, where there is a large immigration and admixture of various races, where immigration of the diseased is guarded against, and where sanitation is good. One might suppose that the diminution of inbreeding which has come about by the increased facilities of migration of modern days might have been accompanied by a diminution of cancer and insanity, but both have increased at an extraordinary rate in towns like San Francisco and Chicago, which are recruited by the most vigorous and sane from other countries. It appears that no stock, however robust, and no intermixture, is capable of withstanding the toxins and the stress of customary life in large cities.

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[1] *Amer. Journal of the Med. Sciences*, Feb. 1900.

According to Hirsch, in 1871–83, the cancer rate of Stuttgardt was 6·3, of Bremen 8·1, of Hamburg 7·6, of Berlin 5·7. At Frankfort the rate was stated to have *diminished* from 1863–1883. This was quite exceptional.

In the very valuable report made by Dr. C. Muirhead to the Scottish Widows' Fund,[1] the following table is given, showing the annual mortality in England from cancer per 10,000 males living at each group of ages and at all ages, during three decennial periods:—

	20–25.	25–35.	35–45.	45–55.	55–65.	65–75.	75 and over.	All Ages.
1861–70 . . .	0·26	0·60	2·04	5·36	12·01	18·62	22·58	2·42
1871–80 . . .	0·27	0·70	2·39	7·05	15·88	25·99	29·85	3·12
1881–90 . . .	0·37	0·79	2·97	9·98	22·99	37·42	39·14	4·30

The rate was about doubled in the last part of the last period compared with the decennium 1861–70. And comparing the rates with the rates from all causes, cancer was reported to have caused 1 in 102 deaths in 1861, and 1 in 41 in 1890.

These figures, and all others in this particular report, refer to males only.

During the twenty-one years there were 539 deaths from cancer among members of the Society; the average age at death was 60·385. Compared with the deaths from all causes, there was "a very considerable increase" of cancer mortality, and "a very serious decrease in the average age at death," contrary to the Society's experience for "death from all causes." The following table shows the changes in three septennial periods:—

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[1] *Causes of Death among the Assured in the Scottish Widows' Fund*, 1874–1894. Reported by Claud Muirhead, M.D. Edinburgh, R. & R. Clark.

Septennium.	Number of Deaths.	Percentage of Deaths in Septennium.	Average Age at Death.
1874–1880	122	4·935	61·980
1881–1887	165	5·440	59·819
1888–1894	252	6·889	59·985

The following table shows the Annual Mortality from cancer in England and the Scottish Widows' Fund among 10,000 males living at each group of ages in the periods named:—

Groups of Ages.	England, 1881–90.	Scottish Widows', 1874–94.
20–25	0·37	...
25–35	0·79	0·82
35–45	2·97	2·56
45–55	9·98	7·48
55–65	22·99	23·99
65–75	37·42	41·91
75 and over	39·14	43·09

The rate of the assured is shown to be considerably higher at the later ages than that for the general population.

The reported death-rate from cancer among the general population of England increased 38 per cent. in 1881–90 compared with 1871–80. The rate among the assured increased 4 per cent. from 1874–80 to 1881–87, and 33 per cent. from 1874–80 to 1888–94. Dr. Muirhead quotes Dr. Ogle's well-known argument in the

Forty-fifth Annual Report (Supplement) for the supposition that the steady and progressive rise of cancer mortality is at least largely only apparent, and not real, owing to the more careful statement of cause and better diagnosis by medical men. The contention was repeated by Dr. Tatham in the Supplement to the Fifty-fifth Report. There can be no doubt that a part of the increase may be truly accounted for by these considerations.

Dr. Muirhead, however, gives cogent reasons for his opinion that there has been "a very real progressive increase."

The clients of the Society have always been able to avail themselves of the services of skilled medical men, and "every death where there was a suspicion of cancer has been carefully investigated . . .;" therefore the theory that the large increase was wholly or even largely caused by a sudden increase of diagnostic skill among the class of medical men who usually certify the causes of death to the Society is untenable."

It has been held, and widely asserted, that the apparent increase is due to the better recognition of those cases of the malady which occur in the internal organs. But Dr. Muirhead demonstrates by a tabular statement that there was an actual decrease of internal cases compared with external in the later period.

	Deaths from Cancer in Internal Organs. Percentage.	Of the External Organs. Percentage.
1874–80	71·05	28·95
1881–87	70·86	29·14
1888–94	65·58	34·42
1874–94	68·36	31·64

The following table shows the Annual Mortality from cancer of internal and external organs, separately and combined, among 10,000 males living at all ages:—

	Internal.		External.		Total.	
	Death-rate.	Ratio.	Death-rate.	Ratio.	Death-rate.	Ratio.
1874–80	5·22	100·00	2·12	100·00	7·34	100·00
1881–87	5·31	101·72	2·18	102·83	7·49	102·04
1888–94	6·70	128·35	3·52	166·04	10·22	139·24

It thus appears that the chief increases of cancer deaths, though no doubt due to deaths of males, was not caused by an increase in the internal or inaccessible group of cases.

Further tables are given showing the large proportionate increase of deaths in the years of age 25 to 35 and 35 to 55, compared with the increase from 55 to 75.

Dr. Muirhead concludes that after allowances for greater precision in statement of death causes, &c., there remains a large real increase to account for the large and progressive mortality. That the age of maximum frequency is gradually getting earlier, according to the Society's returns; while the deaths from all causes are at an age slightly over two years older than previously. That there has been a decrease of 7·70 per cent. in internal, and an increase of 18·89 per cent. in external cancer in the last, compared with the first septennium.

In an article, "Tumours of the Stomach," by Mr. W. Hale White, in Allbutt and Rolleston's "System of

Medicine," vol. iii., p. 495, we find the following observations:—

Primary carcinoma is most frequent in the stomach. No organ of the body is more frequently affected; in nearly half of all cases of carcinoma the primary seat is the stomach. At Guy's Hospital it caused 1·5 of all deaths. It is commoner in men than in women in the proportion of 3 to 2 or 2 to 1.

"As the pylorus is the narrowest part of the stomach, it is the part most likely to be irritated by the passage of indigestible masses of food; and this may explain the greater prevalence of cancer at the pylorus." Brinton found the growth at the pylorus in 219 out of 360 cases; Habershon in 41 out of 79. These figures agree closely with those given by Osler, and those given by Welch after study of 1300 cases. Perry and Shaw found 70 per cent. in the pylorus.

Dr. A. Newsholme and Mr. G. King, in a paper on the "Alleged Increase of Cancer," read before the Royal Society on May 4, 1893, observed that the correction for age-distribution brings out the fact that Ireland seems to enjoy a great comparative immunity from cancer (p. 221). Deficient diagnosis and certification may account for much or all of this.

The curve of the Scottish Widows' Fund has the easiest gradient of all. The insured are well-to-do people. (I found myself on inquiry that the Society practically in the main insured the employing class, not labouring people.) "The weakness of cancer figures in registration is the non-distinction between carcinoma and sarcoma."

The authors considered that the Frankfort figures are of surpassing importance. In those parts of the body in which cancer is easily accessible and detected, there has been no increase in the mortality from cancer between 1860 and 1889. The authors conclude that "the increase of cancer is apparent and not real." Improved diagnosis and certification count for much. The same opinion is reached by Dr. H. B. Allen, in his examination of cancer in Tasmania in 1902. (Introductory Address, Inter-colonial Medical Congress of Australia.)

The Frankfort figures have been, I think, used without sufficient justification. Hirsch recorded the apparent non-increase of cancer at Frankfort many years ago, and I noted the fact in a book published in 1905. Where a single place has shown a decrease in its general cancer rate for a period of years, it cannot prove anything to adduce the uniformity of the figures for particular sites as significant of the non-reality of the general increase of the disease shown by nearly all towns and countries.

In the valuable paper read before the Royal Statistical Society in February 1910, by Mr. C. W. Flux, the rapid increase of the German towns by immigrant young people was demonstrated. The recorded increase of cancer in large German towns is thus made the more remarkable.

The non-reality of the general increase of the malady cannot be supported by the case of Frankfort.

Allowing for a moderate increase which is only apparent, due to better diagnosis, registration, &c., during a part of the last fifty years, the increase is: (1) too widespread and general in civilised countries; (2) too equally shared by external and internal sites; and (3) too continuous since more thorough registration and clearer diagnosis have been in use, to be accounted for by anything but an actual increase of the malady and of liability to it.

If the increase had been only apparent, there would have been a rapid rise during the period of rapidly improving diagnosis and registration, contemporary in each country with the period of this improvement locally, and this rise would have been followed by a flattened curve or level figures. But this has not happened. It did not happen in the case of long-continued, careful diagnosis, as in the assured of the Scottish Widows' Fund. Further, the increase of the ascertained malady in the internal organs would have been great, but no increase would have taken place in the recorded cases in external sites. This has not happened. The cases in nearly all sites have increased.

In Mr. W. Evans' "Medical Science of To-day," just published, and in other medical works, it is affirmed that a large number of cases of cancer taken early, do admit of cure, and that by complete and large removal of the growth, the danger of recurrence has been averted. So that not only are some patients relieved for short periods, but others are saved altogether. There must, therefore, be an increasing number of people who have had cancer, but died of other disorders.

The increase in the number of operations for cancer in each successive decennial period must exceed the increase in the number of deaths. The increase of cancer thus exceeds what appears to be the corrected increase judged by the number of deaths. There must also have been some diminution of cases through the care now exercised by dentists who file off the sharp points of teeth, through precautions taken by chimney-sweeps, by persons handling gas-tar, soot, &c., and through the growth of temperance in regard to alcoholic liquors. Yet cancer has increased.

III

CANCER IN RELATION TO TRADES AND OCCUPATIONS

A few observations, which have been confirmed by all later experience, were made forty or fifty years ago on the excess of cancer to which certain occupations were liable. It has long been known that chimney-sweeps in England have been attacked in a particular way, and it has been known for some years that gardeners and others who handle soot, tar, &c., are more likely than others to be attacked by cancer in the hand.

The decennial and yearly Reports of the Registrar-General for England, the Reports of the Registrar-Generals for Scotland and Ireland, the Census Reports of the United States, the works of Arlidge, Farr, Ogle, and others, on occupational diseases, and many scattered medical papers have thrown a great deal more light on the distribution and incidence of the malady. Sir William Banks and Mr. Roger Williams, both cancer specialists, have contributed most valuable observations, and the recent great work of Mr. Williams on the "Natural History of Cancer" contains many facts which indicate the conditions favourable and unfavourable to the rooting of the perverse growth.

In Oliver's "Diseases of Occupations" it is stated that the mortality of sweeps was 1560, and that of occupied males 440 per million living.

In 1902 the figures were 1330 and 630.

Gardeners get cancer on the hand from soot. Workers in tar, paraffin, and anthracene are similarly attacked.

Cancer develops near sites of bruises or wounds.

But certain classes not exposed to external irritation of the skin far surpass all other classes, except chimney-sweeps, in cancer mortality. These are the groups most subject to alcoholism.

In the *Supplement to the Forty-fifth Report of the Registrar-General*, 1885, it is recorded that the total mortality of commercial travellers from diseases of all kinds was nearly 50 per cent above that of agriculturists. In alcoholism, liver, gout, and suicide they came very high on the list. The mortality of butchers from phthisis was high, 261 against 220 for all males. But in the years 1900–1902 the phthisis mortality rate for butchers was not particularly high, the ratio to the total death-rate being 1 in 8·2, against 1 in 3·4 for printers and 1 in 4 for commercial clerks, though much above that of farmers, 1 in 22.

In Switzerland, out of many occupations, butchers came fifth in phthisis.

Dr. Farr in his "Vital Statistics" observed that at the age 35–45 the total mortality rate per 1000 was for the trades named:—

Farmers	9	Tailors	14
Carpenters	10	Bakers	15
Shoemakers	11	Butchers	17
Blacksmiths	12		

At 45–55 the butchers' rate was 23.

In the period 1860, 1861–71, butchers had a much higher mortality than the average at all ages above 35. At 65–75 it even exceeded the publicans.

The fishmongers' rate was fully as high as the butchers'.

Sir Benjamin Richardson in 1872 observed: "I am not far wrong in saying that no butcher can be found in our large towns who, after eight or ten years' daily work at the slaughterhouse, is free from the effects of rheumatism or heart disease. The mortality of the butcher is as a necessity far above the average."

With this high general mortality, these classes, publicans and their servants, butchers, commercial travellers, cabmen, hawkers, chimney-sweeps, and others, had a high mortality from cancer. The significant fact appeared that the very classes most subject to death from alcoholism, liver diseases, &c., were most subject to cancer.

Dr. Farr noted in his "Vital Statistics" that inn and beershop keepers had an excessive general mortality above all other classes except butchers at the age 55–65. The innkeepers' rate was 39 per 1000, the butchers' 41, the rate of the whole population was 30.

In the Report for 1871–80, after remarking on the extraordinary death-rate of innkeepers and brewers, the Registrar stated: "Butchers have now, and had in the previous record, a very high death-rate, 1170 compared with 1000. Their mortality from alcoholism, liver disease, and urinary diseases is almost identically the same as that of brewers."

In the previous decade the mortality of publicans and butchers was reported to have been high. In London, at 35–45, in 1861–70 their rates were 2·06 compared with 1·714 for occupied males; at 45–55 they were 2·764 against 2·56, at 55–65, 4·582 against 4·385; and at 65–75, 9·052 against 8·283.

Dr. Ogle has given the following as the general rates of mortality of different occupations, ages 25 to 65:—

All males	1000
Miners—South Wales, Monmouthshire	1081
Miners—Durham and Northumberland	873
Miners—North Riding	834
Fishermen	797
Cab and omnibus service	1482
Brewers	1361
Innkeepers	1521
Costermongers, hawkers	1879
Butchers	1170
Farmers	631
Wool operatives	1032

Dr. Arthur Newsholme[1] has stated that diseases of the nervous system, alcoholism, suicide, gout, liver diseases, &c., are high above the average among innkeepers, brewers, butchers, and commercial travellers. In liver maladies, the deaths of innkeepers were 240 against 39 in the general population.

In the *Supplement to the Fifty-fifth Report of the Registrar-General*, 1895, Part II. for 1881–90, the following were the rates given per million living occupied males between 25 and 65 of cancer deaths for the period 1890–91–92:—

All males	470
All occupied males	440
All unoccupied males	960
Clergy	350
Solicitors, barristers	600
Law clerks	620
Physicians	430
Commercial travellers	630
Coach and cabmen	580
Seamen	600
Farmers	340
Farm labourers	360
Maltsters	610
Brewers	700
Inn and hotel servants	650
Do., (London)	670
Do., (agricultural districts)	280
Fishmongers, poulterers	420
Greengrocers	380
Grocers	340
Bakers	450
Bookbinders	600
Butchers	570
Tallow, soap, glue makers, manure makers	730
Tanners	370
Curriers	610
Lead workers	270
Slaters, tilers	630
Plasterers	620
Cotton manufacturers	350
Lace manufacturers	280
Hosiery	290
Paper	220
Copper miners	860
Stone, slate quarrymen	580
General labourers	480
Do., (London)	580
Chimney-sweeps	1560

Supplement to the Sixty-fifth Annual Report of the Registrar-General, Part II., 1891–1900.

The following figures, which must, I think, be only approximate, are given for the rate of mortality of the several classes named from gout and alcoholism in 1900–1902:—

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[1] "Occupation and Mortality," *Transactions of the Sanitary Institute of Great Britain*, 1893.

	Gout.	Alcoholism.
Occupied and retired males	100	100
Fruiterers	150	130
Fishmongers	300	163
Butchers.	250	213
General labourers . . .	150	250
Seamen, merchant service .	50	163
Brewers	250	294
Chimney-sweeps	200	300

The record exhibits very clearly the liability to excessive liquor-drinking in all these occupations, especially in brewers, sweeps, general labourers, and butchers, and may be compared with the high cancer rate of the same trades. The excess in sweeps tends to prove that the condition of body and blood renders them specially liable to the local dangerous irritation of sooty matter. This explains the non-liability of foreign sweeps, who are not particularly intemperate, to sweeps' cancer. In the United States, sweeps' cancer is almost unknown; in Belgium, where coal like the English is used, there is almost complete immunity, but great care is taken to prevent contact with soot; in Germany the practice is to wash daily from head to foot.

In the *Supplement to the Sixty-fifth Annual Report of the Registrar-General*, Part II., Abstracts 1891–1900, p. xlviii, the Registrar-General observed that the death-rate from all causes among brewers fell considerably since the previous record, from 1649 to 1324. The mortality from cancer showed a considerable increase comparing 1900–02 with 1890–92. We may perhaps take it that this increase depended to some degree on the exemption from other maladies.

Among publicans and their servants there was a decline in general mortality, a slight increase in rheumatic fever, cancer, diabetes mellitus, and suicide.

Table IX. shows that among innkeepers the mortality from alcoholism, urinary diseases, and suicide has continually increased since 1880–82.

Deaths from alcoholism showed a slight increase in the class of chemists and druggists.

The mortality of tobacconists from cancer was considerably below the standard, 79 compared with 100 for occupied males. Their suicide rate was also low. The cancer rate of coal merchants was still lower, only 69.

Table V. shows that innkeepers and their servants are among the occupations with the highest mortality from every disease in the table.

In the *Supplement to the Registrar-General's Report for* 1881–90, also in Newsholme's *Vital Statistics*, the following are the cancer mortality ratios for several classes of occupied males in the period 1881–90:—

All occupied males	44
Labourers in agricultural districts	38
Farmers	36
Clergymen	35
Inn servants, agricultural districts	28
Coalminers	26
Papermakers	22
Barristers	60
Commercial travellers	63
Brewers	70
Tallow, glue, and soap makers	73
Chimney-sweeps	156

The following figures of mortality, which must not be taken except as explained by Dr. Newsholme, are of interest for comparison:—*Gout*, occupied males, 2; fishermen, drapers, hatters, bookbinders, and some others, 0; saddlers, 7; gunsmiths and plumbers, 10;

innkeepers in agricultural districts, 16. *Rheumatic fever*, occupied males, 7; hatters and brassworkers, 2; shoemakers and locksmiths, 3; teachers, 10; clergy, 11; publicans, 19; hotel servants, 26. *Bright's disease*, occupied males, 27; farm labourers, 12; farmers, 18; clergy, 27; brewers, 55; doctors, 56; innkeepers, 62; filemakers, 82. *Suicide*, occupied males, 14; clergy, 7; cornmillers, 8; innkeepers, 32. *Liver diseases*, occupied males, 27; clergy, railway guards and porters, cornmillers and miners, 18; farm labourers, 13; lawyers, 55; brewers, 59; publicans, 201. Dr. Newsholme notes the following diseases as showing a great excess in occupations in which alcoholic indulgence is common: diseases of the nervous system, phthisis, urinary diseases, gout, cirrhosis of liver, suicide, and various visceral diseases.

Among the highest number of deaths from alcoholism in 1881 to 1892 were innkeepers and their servants, &c., chimney-sweeps, dock labourers, brewers, costermongers, butchers, and hairdressers. All these had an alcoholic mortality of 34 or more, the rate for occupied males being 13. Despite their high general mortality, these had also a high cancer rate.

Among the lowest rates for alcoholism were those for engine-drivers, fishermen, clergymen, lacemakers, and Staffordshire coalminers.

In the *Registrar-General's Decennial Report for* 1881–90, it is stated that the relative mortality of occupied males being taken at 100, that of coalminers from cancer was 84 in Staffordshire, and 59 in Monmouthshire and South Wales; and that miners are in general a temperate body of men. Their mortality from alcoholism is less than a third, from liver disease not over two-thirds of the standard. In suicide their rate is as 64 to 100. They seem to be much less subject to gout, liver disease, diabetes, and diseases of the urinary system than most other classes.

The mortality figure of butchers exceeds that of occupied males under almost every heading in Table IV. Their mortality due to intemperance is appalling. Among them Bright's disease and diseases of the nervous system are considerably more fatal than the average. Their mortality from suicide is excessive, in the proportion of 23 to 9, for occupied males. They die much faster than the average from gout, diabetes, and cancer. Their mortality from phthisis and diseases of the heart also exceeds the average.

Their mortality has fallen in the earlier ages, but at ages 45–65 has steadily increased since 1871.

Fishmongers died more than twice as fast as did other occupied males from alcoholism, and from diseases of the liver by an excess of nearly 50 per cent. Exceptionally, with these liabilities, in cancer their mortality was 5 per cent. below the average during the period. The comparatively small number of survivals to cancer ages in unhealthy trades must not be forgotten.

In the *Supplement to the Registrar-General's Report, Abstracts*, 1891–1900, it appears that the mortality of *commercial travellers* from Bright's disease, rheumatic fever, gout, diabetes, and diseases of the nervous system was in excess, so were the deaths from suicide. Liver diseases were more than double the average. Alcoholism was 38 per cent. in excess. These causes of death were, however, less frequent than in 1880–82. From my own recollection, I am sure that commercial travellers are more temperate than formerly. I remember, in travelling in many parts of the country more than forty years ago, the heavy dinners and the frequent nips provided for these men.

Among *publicans and their servants* the death-rate exceeded the standard at every age. It was 88 per cent. above the average. At 25–45 it was more than double. The suicide rate was more than double. From cancer there was no marked excess.

Among *brewers* the mortality from all causes was 40 per cent. above the average, and was excessive under *every* heading except accident. From alcoholism and liver disease the rate was nearly three times the average; from cancer 75 per cent. in excess. There was a marked excess in phthisis and respiratory diseases.

The mortality of inn servants exceeded that of innkeepers from cancer.

Carmen suffered more severely, and cabmen very much more severely, from alcoholism than occupied males in general, their mortality figures being 19 and 30 against 16.

Fishermen had about the average cancer mortality, bakers slightly more, and tobacconists less than the average.

Grocers were among the healthiest trades; their mortality was 27 per cent. below the average. Their rate for cancer was low.

Butchers showed a decline in mortality figures at every stage of life, and the increase of cancer among them was considerably less than in other occupations. (This might be expected if high feeding increases cancer, for the general community has been rapidly approaching them in the character of their daily fare.)

The mortality of butchers was below the average up to the age of 25. In their main working period it was

14 per cent. above. It seems that the apprentices are above the average in health, and that the men speedily fall below the average through their mode of life.

Both in 1892 and in 1900–02 their general mortality was higher than the mean of occupied males. They showed an excess in alcoholic, liver and nervous diseases and in suicide.

The cancer mortality figures for the trades named for 1900–01–02 were as follows per million living:—

Chimney-sweeps	1360	Tinworkers	950
Inn servants, London	1350	Inn servants	880
General labourers, London (?)	1160	All occupied males	630
Brewers	1120	Tanners	330
Furriers and skinners	1110	Copperworkers, copper-miners, papermakers	390
General labourers	1110	Wheelwrights	400

In the *Supplement to the 65th Report of the Registrar-General* the following figures of cancer mortality in different occupations during the period 1900 to 1902 represent the comparative rates per million for males between 25 and 65 years of age:—

Occupied males, industrial districts	680	Gardeners	500
Occupied males, agricultural districts	510	Fishermen	650
All males	680	Brewers and brewers' men	1190
Clergy, ministers	480	Publicans, innkeepers, wine and spirit dealers	740
Barristers	640	Inn servants	940
Law clerks	720	Tobacconists	540
Physicians, surgeons	670	Milk-sellers	620
Commercial travellers	720	Fishmongers and poulterers	640
Engine-drivers, stokers	510	Fruiterers	680
Domestic servants	770	Grocers	540
Cab-drivers, &c.	790	Drapers	560
Seamen, merchant service	1050	Coal merchants	470
Dock labourers	760	Coke dealers	470
Farmers	550	Ironmongers	540
Farm servants	480	Butchers	740

Millers, cereal food makers	750
Bakers	740
Furriers, skinners	1150
Curriers	730
Lock and gas fitters	450
Blacksmiths	690
Papermakers	410
Coalminers	430
General labourers	1240
Chimney-sweeps	1520

The above rates may be compared with the following for diseases of the digestive organs, excluding the liver:—

All occupied males	290
Innkeepers (highest) industrial districts	650
Tallow, soap makers, &c.	650
File makers	640
Carpet makers, &c.	570
General labourers, industrial districts	520
Innkeepers, spirit dealers, &c.	460
Chimney-sweeps	440

The very high rate for cancer among merchant seamen may be connected with their daily fare, which resembles that of commercial travellers, and has long been extraordinarily rich, with much salted meat.[1]

It is observed that workers in lead suffer a plumbism mortality 103 times the standard (1900–02), file-makers 57 times, plumbers and painters 22 times, potters 9 times, glassworkers 8 times. These high figures are much lower than those of ten years ago. The classes named suffer also from phthisis, gout, and diseases of the urinary, nervous, circulatory, and respiratory systems. Their cancer rate is not high in proportion to their rates for other diseases.

The plumbism of potters has recently been clearly proved to be very largely owing to their addiction to beer-drinking as a prophylactic.

Cabmen suffer severely from alcoholism, millers from an excess of cancer and of gout, bakers from some excess of cancer. Chimney-sweeps were still highest in cancer, though their rate was one-fourth to one-third less than in 1860–71. Inn servants in London, brewers, furriers, general labourers, and seamen came not far behind. The largest number of cases of sweeps' cancer is in the scrotum always, and next in frequency come the stomach and intestines or neighbouring sites.

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[1] On this and other particulars concerning the fare of countries and classes, see p. 292, &c., "Strength and Diet" (Longmans, 1905).

The mortality from *all* causes in butchers in 1900–02 compared with all occupied males was as 115 to 100, and from alcoholism and diseases of the liver as 219 to 100. The only higher classes in these last diseases were brewers, innkeepers, and inn servants.

It is remarkable that during the period 1900–02 inn and hotel servants had the highest proportion of phthisis deaths to total deaths, 1 in 3·3, and that clergymen had the lowest, 1 in 27, while farm labourers with 1 in 17·1, farmers with 1 in 22, and physicians with 1 in 22·7 also came very low in the list. In these classes liability to phthisis and to cancer go together, and the last-named occupations are largely exempt from both diseases.

Census Report, United States, 1908

In the United States during 1908 the following were the rates of cancer mortality at the age of 55–64, in a number of occupations, the average for the whole country being taken at 100:—

Servants . . .	38·2
Miners, iron and steel workers . . .	68·5
Painters . . .	73·0
Labouring and servants	80·9
Labourers, not agricultural . . .	84·3
Bankers and officials of companies . .	118·0
Carpenters . .	119·1
Gardeners, &c. . .	121·3
Butchers . . .	161·8

The maximum rate was for butchers very far above the mean rate for occupied males. Their rate was high at other ages, except at 25–34.

The rate for miners was low at all ages, for servants low except at 25–34; the rate for saloon keepers was not very high, for tailors high at all ages.

In tables of the relative importance of certain specified causes of death at specified age-periods for each occupation, as compared with the average importance for all specified occupations at the same age-periods for the registration area, it appears that the mortality of butchers from cancer was, out of 38 occupations:—

10th	at the ages	25–34
10th	„	45–54
1st	„	55–64

United States Census Report, 1908. *Deaths of Males over ten from Cancer in the Registration Area. Percentage of Deaths from all causes.*

I have taken from the Report a large number of the stated occupations and mortality proportions, but do not think they are of sufficient value to the present purpose to quote, for, so far as I can judge, the figures are too complicated by different conditions, and especially by the varying number of each class surviving to the higher ages, to enable deductions to be drawn. For example, the rate for clergymen is a high one, 7 against 5·1 for all occupations, and the rate for servants by far the lowest, 2, except that for soldiers and sailors, 1·6. This is probably partly owing to the clergy being healthy and surviving in their occupation till old age, while servants, soldiers, and sailors quit their service about middle age. On the other hand, brewers, distillers, and rectifiers have by far the highest proportion of cancer deaths, 9·9; and this, no doubt, does signify a real greatly increased liability due to their occupation, as shown by mortalities in other tables for ages 25 or 35 to 65. Among other next occupations having a high proportionate rate to total deaths are teachers, merchants, blacksmiths, butchers, leather workers, drovers, and, among women, milliners and dressmakers. Lumbermen, for their age, have a high rate.

The following are given as the rates of cancer mortality in the United States Registration Area, for ages from 45 to 54, for 1908:—

All occupations	6·5		
Professional service	8·8		
Artists, architects, &c.	5·9	(less than 200 deaths)	
Clergy	10·2	„ „ „	
Engineers	8·5	„ „ „	
Journalists	3·0	„ „ „	
School teachers	12·5	„ „ „	
Stockraisers, &c.	9·4	„ „ „	
Lawyers	3·6		
Musicians	4·9		
Physicians	4·3		
Clerical and official	5·9		
Bankers, brokers, officials	6·5		
Mercantile and trading	7·8		
Merchants and dealers	8·7		
Public entertainers	5·5		
Hotelkeepers	5·6	but of unknown age in the total mortality	50·0
Butchers	8·0		33·3
Draymen, hackmen, &c.	5·6		50·0
Saloonkeepers	5·5		
Brewers	13·2		
Carpenters	6·8		
Masons	8·8		
Tailors	9·5		
Steam railway employees	3·9		
Compositors	3·9		

In all British tables there is evidence that the cancer mortality for unoccupied or retired males is much higher than that for occupied males; and inland health resorts, where there is a large resident population of well-to-do people, have a rate much above the average.

In Scotland the official records[1] have it that, "Previous to 1860 the death-rate from cancer averaged 31; from 1861 to 1870 it averaged 40; from 1871 to 1880, 48; from 1881 to 1890, 58; from 1891 to 1900, 73 per 100,000. The amount of real increase is doubtful. The sources of fallacy are at least two; faulty classification in all periods, and improved diagnosis in the later periods." "There is one fact which supports the view that the death-rate from this cause is an increasing one, and that is that the death-rates [general] of the age-periods in which malignant disease is most prevalent are higher than what they formerly were."

It is remarkable that the cancer rate for ministers is about average, not low as in England. For physicians the rate is also about the average. Among farmers and graziers the rate is *above* the mean; 170 out of 1308 deaths in the period 1900–1902.

Among farm servants and farm labourers, and gardeners, &c., and fishermen, about the mean; among coachmen, grooms, and cabmen the rate is high; among commercial travellers, not far from the mean; among maltsters, brewers, and distillers, "not decidedly different from those of all males" (p. 48).

Among hotelkeepers, publicans, wine and spirit merchants, the rate is high (p. 49). Collectively, the liquor trade have a decidedly higher general death-rate (p. 50).

As regards butchers, no definite conclusions were arrived at as regards general mortality. "In the previous Scottish study this occupation was found to have a rather high mortality figure and high death-rate in both age-periods, and similar results were found in each of the English studies and in the second Parisian study" (not in the first) (p. 57). "In the Swiss study it was found to have high death-rates in both age-periods." As regards cancer, in Scotland the rate for butchers appears to be about the average.

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[1] *Supplement to the Forty-eighth Detailed Annual Report of the Registrar-General, Scotland, for* 1905.

Among papermakers the general death-rate was low, but the cancer rate, like that of nearly all occupations in Scotland, was not decidedly different from others (p. 66); among coal and shale miners the cancer rate was low (p. 83); among hawkers and street sellers the cancer rate was high (p. 87); also among general labourers (p. 88).

The tables on pp. 134 *et seq.*, of the Report, give the figures for 100,000 men engaged in the various occupations.

Dr. A. A. Hill has lately demonstrated[1] the effect of the "appalling faith of our industrial classes in the stimulating, strengthening, and nutritious qualities of alcoholic beverages." "The imbibition at every pause in their laborious and dangerous occupation of large quantities of beer as a safe and certain prophylactic against the inroads of lead poisoning has been for at least a hundred years an article of simple faith at once fascinating and destructive." "All experts on the lead poisoning question agree that alcohol is one of the most important adjuncts to plumbism."[2] Experiments on cats have added further proof. "I have yet to meet," proceeded Dr. Hill, "a case of genuine lead poisoning in an abstainer of long standing."

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[1] "Personal Habits in Relation to Industrial Poisoning," A. A. Hill, M.D., *Journal of the Royal Institute of Public Health.*

[2] See *e.g.* Oliver's "Diseases of Occupations," p. 147.

It is certain that alcoholic indulgence similarly favours the onset of cancer, and accentuates the effect of any kind of habitual poisoning, such as few people are without.

An investigation of cancer statistics in Germany by the German Committee for Statistical Study was analysed by Dr. Hirschberg. In men, cancer of the stomach preponderates, with 413 per mille; in women, cancer of the breast with 243 per mille cases. No special trade liability was found in sweeps, chemical workers, &c. The agricultural classes were attacked more in the skin; those engaged in the timber trade more in the glands. Cancer of the urinary organs was specially common among the well-to-do. Acid wines and cider seem to give a predisposition to gastric cancer.

In New Zealand only 48 females died of cancer in the mouth, against 336 males. In males the stomach was the most liable; next came the mouth, lips, tongue, throat, taken together, and the liver; next the kidneys, bladder, and urethra.

Sir Thornley Stoker, surgeon to the Richmond Hospital, Dublin, stated, in an article on cancer of the lips, that "in almost every case the use of the pipe is the exciting cause." Out of 350 cases operated on, only three were women, and these were assiduous smokers. Sometimes the sharp edges of broken or decayed teeth were the exciting cause.[1] In England, in 1901, the deaths from cancer of the mouth, tongue, pharynx, larynx, and trachea were, of men, 1252, of women, 273.[2]

On reviewing the incidence of cancer in different trades and occupations, it appears that there is a continual descent in frequency from the most intemperate classes through the classes of average habits to the most temperate—clergy, ministers, physicians, and some others.

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[1] See *Practitioner*, 1903, vol. 70, p. 577.

[2] *Lancet*, March 10, 1900.

But in all classes, however temperate and frugal, cancer is common. There are, of course, many other factors besides alcoholic liquor which may prepare the tissues for cancer, and produce it.

If irregularities or error in diet be causative, we might expect that where diet is carefully apportioned and luxuries or stimulants of all kinds are largely excluded, the rate would be lower even than the lowest among trades. This is actually the case.

In the Report of the Commissioners of Prisons and the Director of Convict Prisons for the year ending March 1911, it is stated:—"Cancer, the mortality of which increases at every age-group and for each sex in the general population, is again noticeably low in the prison death-rate, and this is not due to the fact that prisoners so suffering were released on medical grounds, for only three were released from this cause from local prisons." It appears that at least three had cancer on reception.

The deaths from cancer were seven out of a population of 20,904. Only four died of cancer arising in the prisons. This, I think, on a rough calculation, would be equal to less than 200 per million of persons over 20, while the rate of the general population over 20 was not far from 1200 per million. As regards general mortality, many years ago Dr. Farr found that among 60 prisons and 267,800 prisoners whose health he investigated, the mortality rate of those on a low diet was less than half the rate of those on a high diet, and about half the rate of those on an intermediate diet.

Asylums.—In asylums there is a similarly low rate.[1] In the 65th Report of the Commissioners in Lunacy, Part I., 1911, it is stated that the cancer rate per 1000 deaths from all causes (except general paralysis) at ages 15 and upwards, in institutions for the insane, was as follows in the years named:—

	Males.	Females.	Persons.
1894	17·7	35·1	26·9
1901	23·6	33·2	28·8
1909	32·7	39·6	36·4

There was a continued irregular rise during the sixteen years, most rapid among the men, as in the general population. The Commissioners observe that the rate per 1000 deaths from all causes in asylums was only 36·4, compared with 99·4 in the rest of the community. The rates per 1000 living are estimated as follows: among the insane 2·98; in the general population 8·11. "Is it," they ask, "because the asylum patient is protected from some yet unknown factor in the development of this disease; or has it to do with mode of living as well as of environment?"

These statistics are confirmatory of those published in the Report of two years before. The age incidence is almost the same as in the general population.

The low rate of cancer in prisons and asylums is the more worthy of consideration on account of the class from which those detained are drawn. The prisons include a very large proportion of hard drinkers and unsound bodies. Yet the prison régime seems to prevent the evil seeds which have been sown from germinating abundantly. Similar experiences have been related of workhouses, and many old people who have chosen to quit them have very soon succumbed to common influences outside, as Old Parr did when sent up from the country to his entertainment at Court and in London.

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[1] See Appendix V. *re* lower diet and lower mortality.

Asylums contain an excessive number of persons who have inherited or acquired constitutional weaknesses, and in many cases tendencies towards consumption or cancer; also many alcoholics who are prone to these maladies. Yet the habits and rule of these institutions reduce the cancer rate much below the rate of the classes from which they were drawn, and below the rate both of occupied and unoccupied persons.

Other communities which are voluntary associations, and whose members are drawn together for religious and ethical reasons, are still more free from many diseases, especially gout and cancer. This record is of very great interest.

I will pass over the Theosophists, the officers of the Salvation Army, and some other societies, though all these, from the reports I have gathered, appear to be quite exceptionally free from some diseases common outside, including gout and cancer, and to live to a higher proportion to a hale old age.

The Russian Doukhobors have existed as a community about a century. They are plain-living, and do not eat flesh or stimulants. About 7000 of them emigrated to Canada when expelled from Russia. They were described by the representative of the High Commissioner as "perhaps the most excellent settlers in the whole of the North-West Territory. For so young a settlement, the contented and joyous expression of the people was remarkable, and this I attribute to the energy and perseverance of the men and the excellent housekeeping qualities of the women." In 1901 the Minister of Justice reported, "Not a single offence has been committed by the Doukhobors." The Canadian papers described them as a fine-looking set, with stalwart frames. "The children looked the perfect picture of health." An old man of eighty-five was as happy and active as a boy. Disease, according to Mr. Blow, was rarely known among them. They were particularly clean, frugal, and moral. They have keen minds, are kind to animals, and ready to help in any work. I have just heard from the Manager that he has never known of any cancer among them.

The Doukhobors in Canada refrain from fish, flesh, or fowl, as food, and live on fruit, vegetables, and nuts. Cows are kept for milk. No tea or coffee is drunk. Wholesome bread, jam, honey, and vegetable butter from sunflower seeds are eaten regularly. The houses are roomy, airy, and clean, the people wash frequently in baths and are scrupulously clean, regular, and orderly. Field labour ceases on Saturday at noon till Monday. There is scarcely any illness; a year passes without a single serious case.[1]

Dr. Alexander Bryce, who writes impartially, has stated in his book just published [2] that Dr. Kellogg has lived in a community (Battle Creek) of flesh-abstainers for forty-five years, and for forty of those years he has made careful note regarding the incidence of cancer amongst them. In all that time he has only known two instances of cancer in flesh-abstainers. In one of these two cases a sarcoma was removed about four years ago, and has not since recurred. Thus it appears, and the fact is most remarkable and important, that only one death has occurred during forty years in this abstaining community. Dr. Bryce, who paid a visit to the Sanitarium, and resided there, states that most of the 500 patients had been previously living on the usual three meals a day of their country, to which in many cases were added large potations of alcohol and excessive quantities of tobacco. Very few of the patients were affected except for the better by the sudden great change of fare. In communication with Dr. Bryce, he informs me that Dr. Kellogg vouches for the facts as given, and that flesh-abstainers are taken to be those who have been at least two or three years on the diet.

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[1] From an occasional correspondent to the *Daily Chronicle*, April 30, 1910.

[2] "Modern Theories of Diet." 1911.

The great feature of the fare is that it is antitoxic, and without constituents likely to cause auto-intoxication. It was low-protein, containing about 10 per cent. of protein, 30 of fat, and 60 of carbohydrate. It was flesh-free, and the drinks were milk, yogurt, apple juice, grape juice, water, and scorched cereal coffee.

Dr. Kellogg, who is a careful scientific observer, states that the following changes are brought about in the body: Clearing of the skin; improvement in its colour and texture; improvement in the blood-count and hæmoglobin; a notable fall of blood pressure.

I have just heard from Dr. Kellogg very fully, in a letter dated March 5, some further particulars, from which I make the following extracts:—

"I have been intimately acquainted with the work for more than forty years. The number of employées has gradually increased from 30 or 40 forty years ago to from 800 to 1000 persons at the present time. The number of employées has averaged more than 500 during the entire period. For the last ten years the number has averaged about 800 or 900. The personnel of our corps of workers is constantly changing. We have received into our training school for nurses over 2000 persons. Besides these, we have received and trained 200 medical students. The great majority of the persons employed were below middle age, and hence not in a period of life in which cancer was likely to occur, But a considerable number have been with us ten, fifteen, twenty, and even thirty years. I am able to say that no case of cancer has ever occurred among the employées of the institution during the last forty years, while they were in the employ of the institution, and I have never known of a case occurring among those who have been in our employ and have continued the non-flesh regimen after going away. I have never known but two cases of cancer occurring in persons who were flesh-abstainers, and these cases were in persons who adopted the vegetarian regimen at a somewhat advanced age."

This report, considering the scientific character of the institution, and all the conditions, is a weighty piece of evidence on the efficacy of the rule. The diet at Battle Creek is not merely flesh-free, but practically poison-free and stimulant-free.

The persons in residence were mostly below the cancer age, but a reference to the Registrar-General's or the United States Census Officer's returns will show that complete absence of cancer in all the 12,000 or 15,000 who passed through, except the two above mentioned, is significant. The inference may fairly be drawn that if these many thousands had been reared and had lived on the Battle Creek fare from childhood on, there would have been no case among them even up to old age.

This record of Battle Creek proves beyond question that a great diminution of the probability of cancer is produced in two years in almost all, or all persons who adopt the diet, and free themselves from the common poisons of ordinary diet. *A fortiori*, the complete adoption from childhood of this fare, if cool, natural, and moderate, would at least make cancer a rare disease, and would save a world of suffering.

Appendicitis seems to some extent to depend on the same elements as cancer, though some other factors such as internal parasites derived from uncooked, unwashed vegetables cause a percentage of cases, in some countries possibly a large number. Lucas-Championière, in an analysis concerning 20,000 Roumanian peasant patients, who live chiefly on vegetables, found only one case, whereas the proportion amongst city-dwellers living on a mixed diet was 1 in 221.

It seems likely that appendicitis may be added to the long list of maladies affecting flesh-eaters most calamitously.

Valuable evidence is afforded by the strictest of the Monasteries.

The Trappists of Oelenberg, living entirely on vegetables, bread, salad, cheese, fruit, and water, and occasionally a small quantity of ale, were seldom ill, and their average longevity was high.

The Monastery of the Grande Trappe had no case of gout or cancer during the twenty-seven years of the physician's experience there. The present Abbot has been so good as to give me the number of inmates during the thirty years preceding 1902. They were, beginning with 1870, 110; in 1875, 120; in 1882, 76;

in 1887, 104; in 1893, 110; in 1899, 118; in 1901, 123. The average for the thirty years preceding 1902, from the figures supplied to me, was 109.

During the last six months I have been kindly furnished by the Heads of Cistercian and Benedictine Monasteries[1] in this country with the following information:—

1. *Benedictine.*—The oldest member could not recall a single case among inmates since 1844, when he began to reside. One member who had been on a Mission in the tropics, and had travelled much in Europe, returned and died of tumour or cancer. The average number residing has been about twenty.

2. *Benedictine.*—Two cases in the twenty-three and a half years. Neither a permanent resident. No case among the brothers permanently residing, who number about forty.

3. *Cistercian.*—No case during the thirty years.

4. *Cistercian.*—"In thirty years we never had a single case of cancer or gout." Number, sixty-six.

5. *Cistercian.*—No record of any case, except one of a "suspicious" nodule, which was removed, without recurrence during the seventeen years which have elapsed. No case of gout. Number of inmates, sixty-five.

6. *Cistercian.*—One case in the twenty-eight years of the Abbot's residence. This case occurred in one who habitually used much of a strong condiment (pepper). Three cases of gout. Members are received of all ages; the average age on reception is between twenty and forty. Some have been received of fifty, fifty-two, and fifty-five. For thirty or forty years the

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[1] I have thought it best not to name the several monasteries, though no such request was made to me.

number of brothers residing has been ninety, more or less.

Taking the total number of the votaries in these last seven monasteries at 420, we find that during a period of about twenty-six years there was only one death from cancer, and that this was apparently due to the exceptional habitual use of a strong irritant. Estimating the average age at forty-five, and that a large number of the residents were over fifty or sixty, the cancer deaths corresponding to the average rate among the general population during the last twenty years would have been, reckoning at the rate of only 1 in 18, not less than 20.[1]

Reckoning the rate per million living, the annual rate of these institutions was 1 in 10,920, or less than 100 per million; but if the exceptional case be omitted, as not belonging to the rule of non-stimulant diet, the rate calculated per year and per 10,000 was nil.

The single case is very instructive. It seems to show that even where nearly the highest degree of abstinence is the rule, a common but unsuspected cause of irritation may interfere with the uniform immunity from cancer of these religious and temperate communities.[2]

CONCLUSIONS

The following conclusions are derived from the facts set forth, and from a number of physiological considerations which cannot be here alluded to.

Cancer shows a graduated increase from extreme rarity to great frequency (1 in 7 of all deaths of persons over thirty-five), according to the habits of nations, races, or tribes.

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[1] The officially estimated rate for males over thirty-five is now 1 in 11 of deaths from all causes, in England.

[2] As to diet in these monasteries, see Appendix IV.

Apart from exceptional customs, it scarcely exists among peoples, and in districts and countries, where the diet is natural, cool,[1] and frugal, without irritating or stimulant adjuncts. The use of water as the staple drink is of effect in immunity.

Cancer has shown a very much larger prevalence in rich than in poor countries, and in the rich or generally thriving districts than in the poor districts of civilised countries. But this distinction tends to become obliterated where the mass of the labouring population adopts a rich fare, including adjuncts such as copious beer, wine and spirits, flesh, coffee, tea, tobacco, and various foods usually taken at a high temperature, much above what the outer skin can bear.[2] In some cities, where the industrial population passes the well-to-do in alcoholism, &c., it has the higher rate of cancer.

The malady shows a real and regular increase in all civilised countries during the last fifty years, or since records have been kept. This increase corresponds with the regular and very large increase in the consumption of stimulant meats and drinks, of hot foods and drinks, and with the increased consumption, now far exceeding physiological requirements, of adjuncts of many sorts, including unwholesome forms of sugar, pickles, drugs, preservatives, and adulterants, salt (in excess), strong cheese, condiments, and tobacco.

Cancer has steadily and rapidly increased with the steady and rapid increase of the consumption of rich foods and hot or toxic drinks in Western Europe.[3] Where natives among whom cancer does not occur adopt this fare, they quickly become subject to the disease.[1] Where cancer is common, as in France or England, groups or societies, adopting a plain fare, without rich, hot, or toxic foods or drinks, quickly become almost immune.

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[1] Below say 112° F.

[2] See Appendix II.

[3] See Appendix VI.

The rapid increase of the disease among males during the last fifty years has been contemporary with the rapid increase of their consumption of hot and toxic drinks, in addition to the excessive alcohol and other adjuncts to a normal staple diet.

Some of the very highest rates are found in the prosperous peasantries of Switzerland, Holland, Normandy, N. E. Ireland, South Germany, and Norway. These people are not all large meat eaters, but their consumption of proteid in cheese is high above the average.

Cancer is commonly a product of lesions or influences upon the internal organs, due to unnatural, excessive, or inappropriate food or drink, affecting the lining membrane, blood, tissues, and skin.

Among these injurious substances are fermented liquors, animal and other proteids in long and continuous excess, highly salted and toxic foods and drinks, hot foods and drinks much above blood temperature,[2] and apparently highly acid drinks, such as sour wine, and some metals or minerals, of which arsenic is an acknowledged example. The use of cold water as a drink has every year been more and more replaced by hot and artificial liquors.

The very close connection of the digestive organs with the blood, tissues and skin, and with the uterus[3] in woman, permits cancer to appear in various parts of the body though the original mischief or causation of susceptibility may have arisen in those organs. The influence of injurious foods and drinks must be considered not only in regard to the actual starting of new growths, but also in regard to the susceptible or hyperæsthetic abnormal state produced by long-continued erroneous habits generating abnormality or senescence in the tissues.

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[1] It is likely that the huge increase of imports of brandy, &c., into Africa, which has already killed thousands of natives, will cause cancer to appear among those tribes which have hitherto been free from the disease. Many of the finest races fall victims to alcohol, and rapidly degenerate.

[2] See Appendix II.

[3] See Appendix III.

In regard to occupations, cancer shows a maximum prevalence in those trades or occupations where there is a maximum consumption of rich or stimulating foods, or both, and especially of alcohol with certain beers or acid or fortified ciders, and the frequency of the disease diminishes on the whole regularly with the diminution of stimulating and excessive fare, according to classes; the trades where intemperance is signified by many deaths from alcoholism have the highest rate of cancer; the most temperate classes have the lowest rate, and the disease almost entirely ceases to exist among religious societies living continuously under a strict rule of great simplicity in diet.

On the other hand, a large number of temperate and partially abstinent persons die of cancer, for nearly all accustom themselves to non-alcoholic toxic drinks, to food and drink at scalding temperatures, and to undue frequency of meals. But the causes of many cases are obscure, especially in women. Bruises or blows, and tight articles of dress can certainly start the disease in the predisposed.

It is clear that many external cancers are preventable, and some are being now prevented by hygienic rules. Thus, cancer of the mouth among the Hindoos will be prevented by the cessation of the habit of chewing a highly irritating and toxic composition, and of their hemp habit. The disuse of the kangri will put an end to kangri burn cancer. The regulations now in force with regard to operatives in the coal-tar industry will stop the cancerous developments on the hands of the men. The disuse of clay pipes would save many smokers from lip cancer. Moderation in tobacco smoking may save many more from cancer of the lip, tongue, jaw, throat, and œsophagus. In some cases filing of the points of sharp teeth will prevent occurrence in the mouth. Greater care in the application of the X-rays or of radium for lupus, ringworm, or other diseases will prevent the danger of radium cancer. Rules for the more careful handling of soot by gardeners and others will prevent cases from occurring in a class otherwise less liable than most. In sweeps, great cleanliness and abstinence from alcoholic liquors will reduce their cancer mortality probably below that of the average of occupied persons. Greater care in the prescription of arsenic as a drug, and strict enforcement of a law against the use of arsenic in beer, &c., will reduce the number of victims in whom this metal starts a dangerous growth.[1] More caution is needed both in curative processes, in trades, and in the handling by the public of strong chemicals, or tarry or antiseptic and corrosive materials.[2]

Long-continued exposure to strong heat, as from locomotive or gasworks furnaces, ought also to be

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[1] "I think I am justified in stating that it is proved that the use of arsenic may create a proclivity towards malignant forms of growth" (Sir Jonathan Hutchinson, *British Medical Journal*, April 29, 1911).

[2] "The application of nitrate of silver to warty growths may be disastrous" (Dr. Ernest Neve, *British Medical Journal*, May 20, 1911).

"Gasworks tar contains a powerful exciter of cell division, and also an augmenting substance (kinetics). The same can be said of gasworks tar pitch. . . . This is strong evidence that the chemical agents which guarded against, as cases have occurred in the parts of the body most continuously exposed to intense heat of fires. Pressure of any tight article of dress, corsets, belts, &c., causes internal distortion and interferes with circulation ; it may have the effect of bruises in some cases.

Cancer of the stomach, the site commonest in men, does not occur in certain races and districts, where simple fare at a low temperature is the rule. The uterus, which is the site commonest in women, is so closely connected with the stomach that probably a similar exemption would be found in the same districts. And in many cases the liver, the next commonest site in men, would also be free from attack.

Considering all the conditions in which the malady arises, and by which it is affected, it appears certain that it is in the main, apart from persistent and great external irritation of the skin, produced by unnatural and inappropriate food and drink, and that it is a product of common errors in this respect. The consumption of very hot and of toxic matter is at present enormous in Europe and America, in addition to excess of ordinary foods. Refreshments, such as tea, between meals are much more habitual, especially among young men, than formerly.

In view of the rapidity with which hitherto unaffected tribes have become subject to attack on adopting European fare, and in view of the exemption

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cause augmented cell division of lymphocytes have something to do with the causation of cancer." "The gasworks tar and pitch are among the most effective substances we have yet found for inducing mitotic figures in lymphocytes." Warts, ulceration, and epithelioma occur in gasworkers. "Experiments with ordinary soot have shown that both auxetics and kinetics can be extracted from it, although it is not so effective for inducing mitosis."—*British Medical Journal*, April 15, 1911.

of religious and other societies drawn from and in the midst of nations heavily suffering, and considering many other facts, some of which show the importance of the particular condition of the body, it seems certain that cancer is to a very great extent preventable, and preventable by the same personal and national hygiene which will prevent many other serious and fatal maladies caused chiefly by improper food and drink.

Considering the comparative freedom of communities which have been removed from ordinary to frugal diet late in life, there is very great encouragement to expect that this change may, wherever adopted, save the great majority who would otherwise suffer.

Many of the classes now most free from cancer are healthiest in other respects, and free from a very large series of diseases dependent upon alcoholism and intemperance in the broadest sense. They are largely free from tuberculosis and many diseases of the digestive tract; of liver, kidneys, nerves, brain, and skin. On the other hand, many of those most subject to such maladies are most subject to cancer. But the wide prevalence of cancer among the temperate who live to be old demonstrates the importance of other factors. The chief of these have been fully noticed. The large use of preserved, highly adulterated, tinned and commercially medicated articles has, no doubt, something to do with the destruction of digestion and health; and the vast quantities of advertised drugs used to counteract them add to the mischief. Among the most damaging of all changes in the last fifty years, probably the substitution of artificial drinks for cold water is the most widespread.

Although, as in gout, the influence of heredity exists, it does not appear sufficiently strong in the case of cancer to preclude the hope that, even where the malady is widely prevalent, it may be very largely reduced in succeeding generations. Many of the most distressing and fatal maladies, such as rheumatism, heart disease, epilepsy, paralysis, and others, would, at the same time, decline. There can be no safer maxim for the diminution of cancer than approximation to the most reasonable and pleasant fare common in countries or communities which are free from the evil. Conquest of predisposition is possible. But the degree of justifiable hope will depend on the strength of the rational will.

APPENDIX I

From "The Baganda." By the Rev. John Roscoe. 1911. Macmillan.

"Beer-drinking was common." . . . "Talking and Drinking from morning till night" (p. 24).

"No Muganda cared to eat cold food; it was customary to serve food very hot" (p. 456).

The meat and vegetables were put into the basket with mashed plantain.

The Katakiro and the Kimbugwee had to kill meat daily, &c.

The chiefs and upper classes had three meals of plantain every day.

The national drink was beer made from plantains. The men were more drunken than the women, but the women were the chief smokers.

From "Fire and Sword in the Soudan." By Rudolf Slatin Pasha, C.B., and Colonel F. R. Wingate, C.B., D.S.O., R.A. 1898. London: Arnold.

Relating experiences at Darfur, the authors show incidentally that beer and meat are not great rarities in the Soudan. "The two brothers (the Sheikh of the northern Berti tribes and his brother Ismail) never by any chance agreed, except in their inveterate love of marissa (Soudan beer)." To vie with one another in emptying a large jar of beer was their greatest pleasure. For their evening meal with these two, the authors shared in a whole baked sheep, which was served to them in addition to "a quantity of roast fowls," asida (a kind of polenta), and jars of marissa. They excused themselves, being Moslems, in their addiction to brandy by regarding it as medicine.

Although beer, brandy, and much animal flesh enters into the dietary of the richer Arabs, the "principal food of the country" about Darfur is the seeds of the wild pumpkin, mixed with dates, and cooked with flesh.

The Mahdi was outwardly a great reformer, and, among other innovations, substituted simpler meals (dates and milk) for expensive feasts at weddings, where drinking bouts had been customary. He forbade the use of intoxicating drinks and smoking. But the whole condition of the people has deteriorated, and the authors make it clear that the Soudan is very far from being able to claim either simplicity or morality in conduct.

From "The Uganda Protectorate." By Sir Harry Johnston.
1905. Hutchinson.

The Bantus are fond of meat when they can get it, goats, sheep, cattle, and wild animals. They use red pepper and spicy grains with their food. Fish are largely eaten, and locusts. Plantains (bananas) are their staple. They have soup, curry, and gravy. Thousands eat nothing but plantain pulp. They drink sweet beer. As soon as the Soudanese soldiers settled in the Upper Nile, they introduced the heady banana spirit, which makes the Baganda quite mad. The sweet beer from bananas is, however, the favourite drink.

From "A Picnic Party in Wildest Africa."
By C. W. L. Bulpett. Arnold.

The Somalis will not touch alcohol. The Abyssinians have a native beer (tedy) and araki (very strong spirits). There is also a native wine. Dinner (p. 116) was chicken or meat, red peppers and butter, all stewed into a mess; rancid butter. But the ordinary native's fare is "of the simplest" ; . . . "a couple of handfuls of dhura or teff, with a feast of raw meat once a week."

An Abyssinian on full rations should have two mugs of flour a day, 2 oz. of ghee, meat twice a week, and game when meat is not obtainable.

From "Tibet and the Tibetans." By F. Grenard. 1904. Hutchinson.

Page 246. Tsamba, which is ground barley-corn, "is not, as some have said, the food of the people." It is a very expensive commodity. A man eats little more than two or three handfuls a day ; "on the other hand, he is continually drinking innumerable cups of tea beaten up with butter salted." . . . "This, with dry, morcellated cheese, forms the real basis of Tibetan food. They add to it a very respectable quantity of meat." . . . "At Lhasa, yak flesh is usually eaten." . . . "The natives eat this raw meat" (dried). At Lhasa, many vegetables and wheat meal and rice are eaten. "The Tibetans are large eaters." . . . "They drink large quantities of their national beer and of brandy." . . . "Illness is extremely frequent, as well as infectious and contagious diseases of every kind, such as cancerous ulcers, leprosy, plague, and malignant small-pox." Also rheumatism and gangrene are common, and ophthalmia.

The diet of the Tibetans is exactly of the kind which we have noted as most productive of disease, and, if statistics were procurable, the cancer rate would probably be found to be the highest in Asia.

From "Lhasa and its Mysteries." By L. A. Waddell, C.B., C.I.E., F.L.S. 1905. Murray.

According to Mr. Waddell, of the Indian Medical Service, the Tibetan's food consists of a few staple dishes. "As a beverage, he drinks all day long cupfuls of hot buttered tea, really a soup or broth." Scones of wheat or barley meal are eaten. "The chief dish is a stew of meat and potatoes, turnips, cabbage," &c., and dried cheese. "His strong drink is the beer of the country made from fermented barley." It is not strong in alcohol, and has a vinegary taste and smell. A coarse fiery brandy is drunk, but not extensively.

Mr. Landon in his "Lhasa" states that the tea with its nasty butter is drunk hot; it is thickened with flour.

From "The Russo-Japanese War." By Thomas Cowen.
1904. Arnold.

"The Tibetans eat practically nothing but meat, and the meat has not made them a superior race." . . . "The Japanese food, soldier-food, nourishes as well as anything." . . . "It makes muscle, bone, sinew, blood, and life and brain, as the Japanese have proved. There are no hardier soldiers in the world." During the war their food was mainly rice, with pickled vegetables, fish, and beans, sometimes preserved beef.

From "Life in the Moslem East." 1911. By Pierre
Ponafidine. Hodder & Stoughton.

The Bedouins subsist largely and for months entirely on camel's milk and dates; locusts and some other foods are added in the season.

The Persians are extremely simple and abstemious in the matter of food. [This refers no doubt to the working class; for the rich are large eaters.] "One often wonders at the strength of the men, who will do heavy work or go long distances on a little bread with a bit of cheese, a bunch of grapes, or dry fruit." Eating hashish (a pulp formed into pills from the flower of the Indian bean) is very fatal, and the custom is increasing. Opium is also a very great evil. Many of the people are terribly affected by it. Half the Persians from thirty-five to forty take it daily. Many children are given opium. If they survive they are miserable creatures.

From "Along the Andes and Down the Amazon."
By C. R. Enock. T. Fisher Unwin.

Page 83. On the Inter-Andean plateau maize and potatoes are the chief sustenance of the poorer classes. Roast corn and potato soup are to the mountaineers the staff of life, as boiled and roast plantains are to the lowlanders. Indian labourers perform almost incredible feats: an Indian with a handful of roast corn and his coca leaves will walk 100 miles, keeping pace with mule or horse. Dr. Spence has known them go two or three days without food or sleep; Mr. Stevenson says their runners go 100 leagues.

From "An Outpost in Papua." By A. K. Chignell.
1911. Smith, Elder & Co.

Page 287. In describing his life in New Guinea, Mr. Chignell states that the fare with two small meals a day was almost vegetarian, eggs, milk, butter, cheese, honey, rice, macaroni, oatmeal, sago, bread, biscuits, and plenty of vegetables and fruit. To this fare he attributed his exceptionally good health. Most Europeans lived on tinned meat, biscuits, and tea. In the tropics white men's illness centres very largely in the digestive organs.

From various sources I find that the Carpathian peoples, the Silesians, Slovaks, Saxons, Wallachs, Bukovinians, Moldavians, Roumanians, and Turks are stated to be generally vegetarians, and tea and coffee were unknown in most parts. On the Central Plain beef and mutton were eaten.

I have given as examples these few extracts of a large number of reports from travellers and residents in hot countries, showing how Europeans may live well if they live wisely, that is frugally and temperately; and as examples of the kind of staples which maintain nations in health, free from cancer and many other disorders.

APPENDIX II

During December 1911 I took observations of the temperatures at which various common articles of food and drink are actually swallowed.

The following are some of the temperatures noted, the foods being allowed a usual interval between the time when they were brought to the table and the time when they were ingested:—

		Degrees.
1.	Rice (on the plate after 2 mins.)	168
2.	Mexican rice (on the plate after 2 mins.)	166
3.	Potatoes and carrots (on the plate after 2 mins.)	162
4.	Maize (on the plate after 2 mins.)	163
5.	Semolina (on the plate after 2 mins.)	148
6.	Barley (after 8 mins. in the dish, 1 min. on the plate)	148
7.	Portion of cauliflower (after 2½ mins. on plate)	164
8.	Thick milk, hasty pudding (after 3 mins. and 1 min. spread out)	124·5
9.	Rice (after 6 mins. in dish and 2 mins. spread out)	134
10.	Coffee with milk (after 2 mins. in small cup)	144
11.	Coffee with milk (after 1 min. in small cup)	130
12.	Coffee with milk (after 4 mins. in small cup)	125·5
13.	Coffee with milk (after 10 mins. in small cup)	116
14.	Coffee with milk (after 15 mins. in small cup)	109·5
15.	Tea (after 2 mins. standing, and 1 min. in cup with cold milk)	142
16.	Tea with cold milk (after 3 mins. and 1 in cup)	137
17.	Coffee with hot milk (after 3 mins.)	149
18.	Rice and carrots (after 2 mins. and 1 min.)	137
19.	Semolina (after 2½ mins. and 1 min.)	125
20.	Large coffee cup hot milk (after 3 mins. and 1 min.)	136
21.	Potatoes and carrots (after 3 mins. and 1 min.)	133
22.	Porridge (after 4 mins. and 1 min.)	161
23.	Porridge (after 4 mins. and 1 min.)	162
24.	Small coffee cup with hot milk (after 3 mins. and 1 min.)	126
25.	Semolina with cheese (after 1 min. and 7 mins.)	105
26.	Porridge, *small* quantity on cold plate (after 1 min. and 2 mins.)	169

27. One-sixth cup of coffee and hot milk (after 1 min. and 1 min.)	135
28. Rice (after 3 mins. in dish and 1 on plate)	176
29. Rice (after the above 4 mins. and 5 mins. spread out one-third inch thick)	127

The coffee after 10 mins. (No. 11) felt only tepid to the lips and mouth, but was stinging hot to the skin. At 109·5° (No. 12), after 15 mins. it felt quite cool to the lips and mouth. Any temperature below 112° may be called cool.

I found, to my surprise, that liquids such as tea, coffee, bovril, soups, and solids such as vegetables and puddings, are habitually swallowed by the majority of people at temperatures from 120° to 170°, very commonly about 140°, a degree quite unbearable by the skin. The solids are often cooler on the outside of the morsels eaten, and are hastily swallowed without chewing. The liquids are often taken in small quantities at a time, so that the burning sensation which might be felt even in the mouth at the highest temperatures is not sufficient to be prohibitive.

There can be no doubt that the majority of people put into their stomachs many times a day portions of food and drink at temperatures far beyond what can be borne by the outer skin, and that hot drinks have greatly increased in vogue throughout the last fifty years, especially among men.

At schools, boys and girls eat and drink very quickly, neither cooling nor masticating their food. Business men, clerks, &c., in towns, bolt their hot meals.[1] Farm labourers are, as a class, more leisurely in eating.

At the universities an extra meal has been added in the afternoon, and the ladies' custom of tea-drinking has become common. Tea and coffee-drinking has enormously increased among all classes in England and America, especially among men, and it is among men that the greatest increase of cancer has taken place.

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[1] Bamberger attributed the common occurrence of gastric ulcer in cooks to their habit of tasting food when very hot.

APPENDIX III

The excess of cancer in English chimney-sweeps, who as a class were addicted to alcohol, and the normal rate of cancer in foreign chimney-sweeps, who are more careful and temperate; the great excess of cancer in all those trades where alcoholism is most common; the excess of cancer in those classes which are addicted to high-feeding; the excess in the richest countries and parts of countries during the last fifty years; the production of cancer by courses of arsenic, and other facts, show that cancer is at any rate to a very great extent a result of the use of unnatural or excessive articles of food and drink, and of their action through the internal organs.

In considering the site-incidence of cancer in connection with such facts, it appeared to me quite clear that the manifestation of the disease not only in the internal organs, stomach, liver, &c., but in *any* part—mouth, tongue, face, breast, scrotum, &c.—may be, and is generally, due, not so much to any special irritation of that part as to the condition of tissues, blood, skin, &c., brought about through the internal organs by improper diet. The point of resistance-overcome is largely dependent even in skin cancers on the internal condition.

We see a similar distant action in many other diseases. Several diseases of the skin are brought about by wrong feeding. Gout manifesting itself in a foot or in a hand is produced by wrong treatment of the stomach and liver. Many eruptions and wrong conditions of the skin follow particular kinds of feeding. Scurvy is a result of excessive use of salt meat, &c., and deficiency of vegetables. Rheumatism in joints, and neuritis in the arms, are largely connected with diet conditions. Internal ills are expressed on the external skin in innumerable ailments.

The fullest confirmation of the close connection of digestion, the stomach, and neighbouring organs with the skin was found in the writings of a great authority. Dr. S. O. Habershon, in the "Diseases of the Stomach," wrote as follows:—

"The lining membrane of the alimentary tract is continuous with the skin, and in one sense it is external to the living organism, so that the stomach and other parts of the intestinal canal have been spoken of as inversions of the external investment; the intimacy of their connection bears out that form of expression, although the union between the stomach and the skin does not require continuous irritation to explain the phenomena."

Moreover: "The sympathy of the stomach with the urinogenital organs is so well known that it scarcely needs comment." . . . "Changes in the uterus and the ovaries are often marked by characteristic irritability [of the stomach]." . . . "Disturbance of the stomach will greatly increase the cutaneous malady [eczema]." . . . "In the forms of nettlerash from the crustacea, &c., it ought to be said that the irritation on the skin is due to the absorption into the blood of irritating extraneous material."

In another chapter, Dr. Habershon states that "there is the closest connection between the uterus and the stomach." This seems to have a bearing on the fact that while cancer of the stomach is the commonest in men, cancer of the uterus is commonest in women.

He observes as follows on the insensibility of some of the internal organs: "Generally speaking, we find that the mucous membranes, except where they approach the outlets of their respective canals, are free from ordinary sensibility, and may undergo very marked changes in their condition without any painful manifestation. Acute disease may take place in the mucous membrane of the kidney or bladder with complete immunity from suffering. A similar fact is observed in relation to the parenchymatous viscera." . . . "Acute inflammation and disease of the stomach may exist with entire freedom from pain." . . . "Intense mental anxiety will cause such an irritability of the stomach," &c. "Mental repose has a wonderful effect in conducing to the healthy performance of digestion." . . . "Amongst general considerations, the state of the mind stands foremost." . . . "The habit of snuff-taking and smoking produces a relaxed condition of the mucous membrane of the stomach and impairs its digestive powers."

In treating of ulceration of the stomach, Dr. Habershon, in acknowledging the obscurity of its causes, attributes some cases to chronic inflammation, due to intemperance and irregularity in diet, and some to wrong nutrition, mental depression, anxiety, &c. Rich soups, highly-seasoned dishes, pepper, mustard, &c., should not be eaten, nor pastries, salads, unripe fruit, &c. In cancer, "the diet should be so regulated that any renewed excitement and hyperæmia of the mucous membrane may be prevented."

I have quoted these passages because they are of importance as showing: (1) The close connection of skin, uterus, and other parts with the digestive organs. (2) The expression on the skin of disturbances of the stomach. (3) The absence of pain in some of those internal organs connected with digestion which may be daily irritated and wronged by improper materials eaten or drunk. (4) The effect on stomach, digestion, and assimilation of mental states, worry, &c. (5) The impairment of digestion, &c., by smoking, intemperance, and, in the case of unperceived but common internal irritation, by many articles of food and drink the reverse of bland or mild, producing hyperæmia, irritation, &c.

The following further quotations prove the consensus of many of the most distinguished doctors as to the harmful effects of alcohol, the drug drinks tea and coffee, and excess of rich food of various kinds. They may, I think, be taken to represent the views of the most advanced scientific students of the subject, including chemists and physiologists; unhappily, not many men of science or of no science have realised how they and others are, by obedience to custom, killing themselves by degrees and reducing their physical and mental energy.

The discovery of last century of the highest import and least regarded was that which revealed the truth that most human maladies, physical and mental, are the product of material poisons, chiefly derived from wrong foods and drinks. The revelation was the result of the labour of many minds illustrious in science. Following upon it must come the disclosure of the possibility of greatly increasing human power, intelligence, and efficiency.

I. Excessive Alimentation

In a letter to the *Times* of November 22, 1904, Professor Clifford Allbutt directed attention to the paramount importance of considering the question of diet in all schemes of physical education. "The ordinary man eats too much. By a closer adjustment of food to work, the sum of work of which a man is capable is prodigiously increased."

I think a careful computation will show that not only could at least £300,000,000 be easily saved to the nation by a better appreciation of food values and living by knowledge, but that *at the same time* millions of cases of disease and ailments would be prevented every year, as well as an immense amount of misery and crime. And beyond this gain from prevention would come an inestimable positive gain in strength and spirits.

In the *Report of the Commission on Physical Deterioration* it is stated: "All the witnesses concurred in claiming the first place for food" as the means of arresting juvenile degeneracy. "Food," said Dr. Eichholz, "is the point about which turns the whole problem of degeneracy." . . . "Their breakfasts are nominally bread and tea," the dinner some inferior fish in reeking cotton-seed oil, and rotten fruit. The tea is probably in the dangerous form, a stew. Mrs. Close thought beer would be wholesomer than this tea. Dr. Collie considered it most deleterious. Tinned foods are used quite commonly; a bloater and pickles form many a child's supper. Parents feed children off their own plates—a disastrous custom.

Tinned food has to a great extent superseded fresh food among masses of the population. A lady gave evidence that in one farmhouse, notwithstanding the existence of a well-stocked garden, there was nothing but tinned food, tinned vegetables, and tinned fruits for breakfast and dinner.

The following dicta of qualified persons have a bearing on the conditions favourable to the growth of malignant tumours.

Dr. Abernethy: "I tell you honestly what is the cause of the complicated madness of the human race. It is their gormandising and stimulating the digestive organs to excess, and thereby producing nervous disorders and *irritations*."

Lessius: "To avoid all those inflations, torments, obstructions, crudities, and diseases that come of a full diet, the best way is to feed sparingly of one or two dishes at most."

Sir Thomas Clouston, of Edinburgh: "I have seen a change of diet to milk, fish, and farinaceous foods produce a marked improvement in regard to the nervous *irritability* of such children."

Dr. Cullen: "Where less animal food is taken, and where the national beverage contains almost no acid, gout is comparatively rare."

Mrs. Earle: "Eton boys ate meat four times a day and drank tea twice."

Dr. Adam Ferguson, of Edinburgh, became a Pythagorean at sixty, after strokes of paralysis. He ate thereafter only vegetable food and drank only water and milk. He got rid of every paralytic symptom, and was described by Sir Walter

Scott as having been, long after the eightieth year, one of the most striking old men it was possible to look at. He lived to ninety-three. Still more remarkable is the case of a boy who had been rheumatic and weak getting the highest prize for all-round physical development out of 5139 candidates. His regeneration had been effected by pure food and water and abstinence from flesh, tea, coffee, tobacco, and stimulants. But there are great numbers of cases of this kind—in fact, scientific temperate nutrition is the most successful of all means of health. And many men who were far from strong have become famous athletes through the reformed fare.

Dr. T. K. Chambers, referring to acute rheumatism and gout, wrote: "If meat in any form, solid or liquid, be eaten, it seems to turn into acid, which is already in excess in the blood." A similar experience in cases of chronic rheumatism or gouty tendencies should be more generally accepted as an indication for a light diet.

Dr. Farquharson has stated that: "A great many diseases, such as gout, rheumatism, diseases of the kidneys, &c., are produced by eating inordinate quantities of meat."

Professor Metchnikoff has written: "Hufeland advised that we should use vegetable rather than animal food, as animal food is more liable to putrefaction, whilst vegetable substances contain an acid principle which retards our mortal enemy, putrefaction. Here the physician of a day long past anticipates one of the discoveries of modern science. . . . Progress would consist in simplifying many sides of the lives of civilised people."

Dr. Keith: "Excess of animal food may be taken for years without evident harm. . . . Naturally the overworked kidneys are the first to give out. A very common evil arising in this way is what is called general paralysis; the number of cases has increased enormously during the last thirty years. . . . The food of the working man in former days was simple and good, mostly oatmeal, eggs, milk, fish, potatoes, and a few other vegetables."

Dr. Robert Hutchison: "The chief fault in the diet of the working-classes is the excessive use of tea and bread. I advise the buying of more vegetable foods. Beef extracts have little value. One good meal of porridge should be taken daily."

Drs. Parkes and Kenwood wrote[1]: "Excess of nitrogenous food causes not only an abnormal production of the poisonous alkaloids, but an excess of nitrogenous waste. . . . The liver, kidneys, and the other excretory organs are overtaxed, and gout, or kidney and liver disease results."

There can be no doubt that these statements accurately describe the mischief caused by excess. But it is right to bear record that the Eskimo, who live very largely on seal's and other flesh, raw or putrid, do not seem to suffer from their excess of nitrogenous food. They use large quantities of fat and oil. Their health is not particularly strong, and they are prostrated by influenza twice a year; they do not live to be old, but I have seen no evidence that their feasts of fleshy fare produce in them the diseases above mentioned.

Sir William Allchin, in *Quain's Dictionary:* "The result of excess of food is often seen in lassitude, indigestion, headaches, constipation, skin eruptions, and failures of the heart's action."

Dr. A. Montenuis, of the Sanatorium of Sylvabelle, states that the main food of the labouring peasant population of Anatolia, in Turkey, is a white cheese and *yoghurt*, or curdled milk. Dr. Tubbendjuan, who communicated his observations on the staple to a French medical society, found the food suitable to nearly all persons and patients. Metchnikoff discovered that many of the habitual microbes of the human intestine constitute a harmful influence; they excrete poisons and irritate the organs; this irritation brings about irritation of the tissues, hypertrophy of the conjunctive tissue, sclerosis of the organs, and finally senile decrepitude.

This condition has a very distinct bearing on the causation of cancer.

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[1] "Manual of Hygiene."

The Bulgarians, he noticed, during his stay in their country, especially the robust peasantry of the mountains, live largely on curdled milk. He made out that lactic acid ferments are the most powerful enemies of the harmful microbes.

These Bulgarians are remarkable for the number who live to old age in health. They do not use artificial stimulants, and their diet induces frugality.

"A so-called strengthening diet," says Dr. Montenuis, "is the main factor in arthritism and sclerosis, the two principal causes of decadence in our times. Not only does it bring premature old age on the individual; it visibly brings about the degeneracy of the race." "Hereditary arthritism, added to a faulty general and alimentary hygiene, is the main cause of the fact that degenerate and sickly-looking children are so numerous now." It is also the "frequent natural cause of childless homes." In Paris "it is quite exceptional to find a family extending to over four generations." Huchard considers that "the animal food we use and abuse in an increasing degree is not food at all; it is a continual poisoning." Weariness, depression, and the neurasthenic troubles of our times are, in Dr. Montenuis' opinion, "the painful outcry of a nervous system that has been depressed by food-poisoning and excitants." Artificial excitants are principally meat, wine, alcohol, tea, coffee, &c.

Professors Chittenden and Fisher, of Yale University, have accepted a statement[1] of their views submitted to them, from which I have made the extracts which follow:—

People in general eat and drink too much, especially too much meat, fish, and eggs. Excessive consumption of proteid foodstuffs is the greatest evil affecting man's nutrition. The excess often forms a culture bed for harmful germs, producing auto-intoxication, self-poisoning of the body. The researches of Metchnikoff, Bouchard, Tissier, Combe, and other eminent scientists have shown that auto-intoxication is the source of a great number of the most serious chronic diseases which afflict mankind. It may safely be said that the minimum proteid is placed twice as high as careful and repeated experiments show to be really necessary. The habit of excessive and too hasty eating and drinking is the greatest deterrent to the attaining by men and women of a high grade of efficiency in work, of better health, and of longer life.

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[1] See "The Art of Health," by Upton Sinclair and Michael Williams.

The excessive use of salt is much discouraged by modern physiology, and seems to be a cause of catarrh, of kidney troubles, and of Bright's disease.

Glucose, in the form of candy, syrup, adulterated honey, and various sweets, is said to produce many cases of diabetes and other ailments.

Mr. Williams (Mr. Upton Sinclair's collaborator in "The Art of Health") had tuberculosis, and was a free user of tobacco, alcohol, and coffee. After a stay at Battle Creek Sanitarium his lungs entirely healed, as a result of the "low proteid" diet, open-air life, and a conversion from habits of eating, drinking, and smoking. In three months his physical strength increased from 4635 to 5025 units, and the "cell count" of the blood showed a great gain.

Professor Russell Chittenden, after his adoption of the low proteid and reformed diet, lost in a few months the severe muscular rheumatism and recurrent bilious headache which had plagued him for years, and these disorders never returned. He had been a hearty eater of three meals a day.

The experiments with flesh-eating and non-flesh-eating students and athletes gave results very strongly in favour of the latter—that is, the vegetarian. *E.g.*, two of the fifteen flesh-eaters succeeded in holding the arms horizontal over a quarter of an hour, but twenty-two of the thirty-two abstainers surpassed that limit, and fifteen exceeded half an hour; nine exceeded one hour, four exceeded two, and one exceeded three hours. With the nine healthy students, the results showed so great an increase of endurance as to seem at first incredible.

Dr. T. Ioteyko, head of the laboratory of the University of Brussels, and Mdlle. Kipiani made a number of experiments on men and women subsisting on the flesh and non-flesh diets, and found that the vegetarians surpassed the flesh-eaters in endurance from 50 to 200 per cent. They also recovered from fatigue far more quickly than the flesh-eaters.

Dr. Turck, from his experiments on animals, found meat extractives highly injurious, partly through the action of intestinal bacteria, producing poisons.

The reasons for the reduced efficiency, bodily and mental, brought about by flesh-eating, are now manifest; and the great increase in national health and work-power which a scientific reformed diet would produce may be estimated from experiment.

Metchnikoff discovered that the immediate cause of old age is not merely the accumulation of poisonous wastes, but is due to a destruction of tissue cells by macrophages, which in an unhealthy condition of the body turn from their proper work as scavengers to preying upon the vital components. He noticed that the Bulgarians and Hungarians are the longest-lived races in Europe, and are generally free from appendicitis, colitis, and other diseases due to intestinal infections. In these races are found many centenarians doing their daily work in health. They live largely upon yogurt (sour milk), which contains immense numbers of beneficent microbes, capable of killing or expelling the poisonous germs of the intestines, and thereby capable of maintaining the vigour of the vital cells and protecting them from attack by the macrophages. But the Bulgarians have attained their high degree of health and strength on a diet very different from the Western European average fare.

The Italians and the Chinese are the only two of all the races represented at Chicago that do not show a far greater death-rate from cancer than in their own homes. The

Italians keep up the use of macaroni and spaghetti; while the Chinese adhere to their native diet of rice. The nations showing the higher mortality consume large quantities of canned, preserved, dried, and pickled meats, sausages, &c. Meat eaten by the poor had been condemned by official inspectors. ("Art of Health," p. 165.)

Dr. W. H. Guilfoy, of New York Health Department, showed that cancer, heart disease, and Bright's disease have greatly increased, and that foreigners and flesh-eating nations have the highest rates of mortality from these; thus the English, Irish, Germans, and Bohemians, all large flesh-eaters, have cancer rates of 140, 166·6, 151·9, and 246; while the Austro-Hungarians, Swedish, Polish, and Italians have rates of 151·8, 84·7, 130, and 63·7. Here, as always, the Italians come out best among European immigrants. In heart disease, the largest flesh-eaters of the nations named had rates 207, 381·2, 231·5, and 237·4; and the more moderate 190·7, 69·7, 170, and 161. In Bright's disease there was a still more striking excess among the large flesh-eaters.

Food may be, and often is, a source of poison.[1] The severest epidemics of food poisoning have not occurred as the result of meat actually putrefied—that is, of meat which can be recognised as putrefied by the smell. "The most toxic products of putrefaction are present in the earlier stages of the process."

In a leading article in the *Lancet*, March 3, 1900, the following statement appeared: "Those individuals who have habitually overstepped the physiological limit" have a morbid condition "shown by premature ageing . . . small dilatations of superficial vessels and progressive arterial sclerosis, long before the natural period in which senile decay may be expected."

Elsewhere it is stated that—"As the pylorus is the narrowest part of the stomach, it is the part most likely to be irritated by the passage of indigestible masses of food, and this may explain the greater prevalence of cancer at the pylorus."[1]

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[1] Allbutt's "System of Medicine," vol. ii., 1902.

"The point of chief therapeutical interest which has been made out is this: that the ingestion of large quantities of proteid matter is attended with an increased production of uric acid, and *vice versa.*" ["According to the view set forth in this article, the essence of the gouty diathesis consists in an enduring tendency to the accumulation of urates in the bodily fluids, and to their precipitation as crystals of sodium biurate in the tissues."] "It does not appear clear that proteid substances derived from the animal kingdom differ in this respect from those derived from the vegetable kingdom. Nevertheless, inasmuch as the commonly used articles of food of animal origin, such as butcher's meat, poultry, game, fish, eggs, and cheese, are richer in proteid stuff than the commonly used articles of vegetable origin, such as bread, oatmeal, rice, potatoes, and garden produce, it is thus that a vegetable diet is less productive of uric acid than an animal diet."[2] The use of fat, starch, and sugar has no effect in producing uric acid, and their consumption reduces the intake of nitrogenous food, and so diminishes uric acid. The albuminoid matter in butcher's meat is 19 per cent., in game 22, in fish 17, in egg 13, in cheese 30, in bread 8, in oatmeal 12, in rice 6, in green peas 6, in green vegetables 1 to 2, in potatoes 3, and in fresh fruit 0·5 to 1. "Gouty people should be advised to partake cautiously of butcher's meat, fowl, game, and cheese, and to partake as freely as their digestion will permit of bread, rice, garden vegetables, salads, and fruit." "The highly important part played by certain kinds of alcoholic beverages in the genesis of the gouty constitution has been well established." "Distilled spirits have little influence . . . the richer wines and strong ales and stout are highly provocative of gouty manifestations." Sweet and new wines are the worst. Common salt beyond the necessary minimum increases goutiness. "A word may be said in favour of a more systematic use of water" as a drink. "Sedentary occupations are highly injurious."

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[1] "Tumours of the Stomach," by W. Lee Dickinson, Allbutt's "System of Medicine," p. 555. Edition of 1897.

[2] "Diet in Gout," by Sir William Roberts, p. 187.

Dr. Chalmers Watson has pointed out that, in connection with the increase of appendicitis, the most notable change in diet is the increase in the consumption of animal proteid food. The imported meat has risen from 3 lbs. per head in 1850 to 50 lbs. in 1900. "I think," he said, "that we have here the most important factor in the development of the disease." He found by an extensive experimental investigation that the administration of an excessive meat diet is frequently followed by structural changes in the intestinal tract, which are invariably most pronounced in the region of the cæcum." Dr. Fowler, in his work on appendicitis, wrote that "infection (with micro-organisms) is not only the principal and necessary cause of appendicitis, but that it is the primary cause." Dr. G. M. Edebohls wrote that "Adenot and Gouilliond began in 1891 the study of the bacteriology of the appendix, and showed appendicitis to be due, in practically every case, to bacterial invasion of the appendix walls."

Dr. Cozens Bailey, M.S., in a lecture at St. Bartholomew's Hospital in 1908, said: "Appendicitis seems to have become more common and fatal of recent years, and this rightly suggests all sorts of questions as to our altered manner of life, our increased luxuriousness, the quality and quantity of our food and drink," &c.

Sir Henry Thompson wrote in his well-known book:[1] "The only legitimate mode is to masticate every morsel until it becomes a soft pultaceous mass and is easily swallowed in consequence, unaided by drink."

"When one has a healthy appetite for solid food at meal times, drink is never desired, at any rate to begin with.

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[1] "Diet in relation to Age and Activity." Sir Henry Thompson F.R.C.S.

. . . All the solid food we eat contains half its weight of water."

Water for grown people is by far the best drink. It is "a solvent of solids, and is more powerful when employed free from admixture with any other solid material." Milk is superfluous, and often even mischievous as a drink for those who have stopped growing. "There are some grounds for the belief that those who have throughout life from their earliest years consumed little or no flesh, but have lived on a diet wholly vegetarian, will be found to have preserved their teeth longer than those who have always made flesh a prominent part of their daily food."

"The typical man of eighty or ninety, still retaining a respectable amount of energy of body and mind, is lean and spare, and lives on slender rations."

"Indigestion, as commonly spoken of, is rarely a disease in any sense of the word, but merely the natural result of errors in diet."

"Nothing can be more undesirable" than eating a five-o'clock tea or at "between meals," and even a single morsel of solid food is pernicious. In ninety-nine cases out of one hundred the individual acquires the prevailing habit of his associates, and often largely exceeds, both in quantity and variety of food, what is necessary. Attacks of biliousness or other disorders recur. In later years "the over-supply of nutritious elements ingested must go somewhere, more or less directly, to produce disease in some other form, probably at first interfering with the action of the liver, and next appearing as gout or rheumatism, or as the cause of fluxes or obstructions of various kinds."

"More than half the disease that embitters life is due to avoidable errors in diet."

In "Diet in Gout," Dr. Arthur Luff has written as follows: "Derangements of the gastro-intestinal tract constitute a most important factor in the development of acute, chronic, and irregular gout. It is therefore of the utmost importance to secure and maintain a healthy condition of the gastro-intestinal mucous membrane . . . in order to guard against auto-intoxication, which is undoubtedly an early factor. . . . Gout is a disease which is due to faulty metabolism, probably both intestinal and hepatic, as the result of which certain poisons are produced. . . . It is well known that the excessive consumption of rich nitrogenous food, combined with excess in wine and malt liquors, both induces and excites gout. . . . The subjects of gout are generally persons who live well and consume a large amount of animal food. . . . Gout is a toxæmia. But the assumption that animal foods are necessarily poisonous to man is an entirely erroneous one. Farinaceous foods are most likely to disagree." [This is not generally held.]

The order of acidity of alcoholic drinks, according to Dr. Bence Jones, is as follows :—

Acidity.	Gout-producing.
Moselle	Port
Rhine wines	Sherry
Burgundy	Other stronger wines
Madeira	Champagne
Claret	Stout and porter
Champagne	Strong ales
Port	Claret
Sherry	Hock
Malt liquors	Moselle
	Weaker ales

Some of the above remarks might, I think, be aptly applied to the conditions leading to cancer. But the order of hurtfulness of alcoholic drinks would be different. The acid wines and ciders and beers, porter, &c., would come high in the list of cancer producers. Dr. Luff observes that bottled or champagne cider should never be used by gouty persons owing to its liability to set up gastro-intestinal fermentations.

In the article "Gout," in the *Encyclopædia Britannica*, it is stated that "Gout is in a marked degree hereditary. But there are habits and modes of life, the observance of which may induce the disease even where no hereditary tendencies can be traced. Gout is said to affect the sedentary more than the active. If, however, inadequate exercise be combined with a luxurious manner of living, with habitual over-indulgence in animal foods and rich dishes, and especially in alcoholic beverages, then undoubtedly the chief factors in the production of the disease are present."

Sir Joseph Fayrer, concerning India: "New arrivals should abstain from much animal and stimulating food. . . . Curries, as generally prepared, should be sparingly consumed. . . . As a rule, people eat too much in India."

Dr. William Hall, of Leeds, testified that the British child often gets black pudding, tinned fish, sausage, polony, and what not, while not a few British fathers and mothers drink beer and gin, and eat meat, biscuits, cheese, liver, entrails, and onions as their common fare.

Physicians have had under observation men of sixty and seventy who at a single stroke had all meats and meat extracts cut off, and in no case was the result injurious, but in most cases improved vigour.

Dr. Jablowski concluded that vegetables ought to be the basis of regimen in *irritative*, plethoric, and gastro-intestinal troubles.

Mr. Moore, of the Middlesex Hospital: "Cancer is eminently a disease of persons whose previous life has been healthy, and nutritive vigour gives them otherwise a prospect of long life."

Dr. Frederick Roberts, in the later edition of *Quain's Dictionary:* "The gouty diathesis is chiefly promoted by foods which are rich in nitrogenous elements, and especially lean meat." Undue consumption of sugar, starchy foods, and some wines and malt liquors, contribute to produce gout.

Mr. Sylvester Graham states[1] that according to Ross Cox, who spent several years beyond the Rocky Mountains as an agent of the American North-West Fur Co., the Canadian boatmen and others in the company's service receive, according to stipulation, and regularly consume (when they have no other food) 8 lbs. clear flesh a day for each man, and 10 lbs. if it contains bone.

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[1] "The Physiology of Feeding." Sylvester Graham.

Dr. A. Wolff wrote: "Cancer is extremely prevalent in the timber districts of North America."[1]

Mr. Arthur P. Silver gives some particulars of the diet of lumber-men in Canada: buckwheat cakes, molasses, potato pies, baked beans, white bread, pork, bacon; tea, black as ink, sweetened with molasses syrup, and used in vast quantities day and night.[2]

"The diet of British merchant ships is extraordinarily rich: 1 lb. of bread, 1½ lbs. of beef or 1¼ of pork, ½ lb. of flour, and ¼ lb. of peas on alternate days." This being the case, it was expected and found to be the case that the merchant sailors' cancer rate is among the highest.[3]

Sir W. Banks, M.D., wrote in the *Lancet*, March 1900: "I am pretty well convinced that when a man is over forty-five years of age excess in food is perhaps worse for him than excess in drink." A widely-spread second-rate kind of gout seems to be produced and a cancerous diathesis. "The better the nutrition the more deadly and rapidly-growing is the cancer." In Mr. Roger Williams' book on the "Natural History of Cancer," there is much to the same effect. Both Sir W. Banks and Mr. Williams were cancer investigators of great experience. The extreme importance of thorough mastication, which would probably prevent much appendicitis, indigestion, and cancer, has been pointed out by Dr. Harry Campbell (*Lancet*, July 11, 18, &c., 1903). In all matters connected with the common self-poisoning by articles of food and drink, Dr. Alexander Haig has long been a protagonist for reform.

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[1] *Nineteenth Century and After*, June, 1903. Dr. A. Wolff.

[2] *Empire Review*, February, 1905.

[3] See "Strength and Diet," pp. 289–292, &c.

II. Alcoholic Excess

Article on "Alcoholism." By H. D. Rolleston, M.D., F.R.C.P. (In Allbutt and Rolleston's "System of Medicine.")

Beer, porter, cider, &c., "may give rise to dyspepsia, but not in nearly so marked a degree as the more concentrated spirits. With the exception of fully fermented or rough cider, they are a prolific source of gout." Beer has been adulterated in many ways. Picric acid, strychnine, quassia, and chiretta have been used instead of hop bitters; also cocculus indicus, opium, salt, and salicylic acid have been largely used. Arsenic may gain an entrance into beer in the process of its production, and has sometimes been in such quantities as to give rise to epidemic poisoning. In the outbreak in N. England in 1900–1 the sugars used in brewing contained arsenic.

Sour cider may set up colic and intestinal disturbances. It can dissolve lead.

The total amount of alcohol taken is the important factor in determining nervous symptoms [in all kinds of liquors]. Potassium sulphate is often added to red wine in France. Absinthe drinkers become utter wrecks physically and morally. Absinthe is drunk chiefly in Paris.

The liquor traffic is the hotbed of intemperance. [That is, dealers in liquors are specially intemperate.] Next come cabmen, drivers, night-watchmen, bargemen, and hawkers.

Ministers, schoolmasters, officials in Army and Navy, medical men, and lawyers are the least addicted to alcohol. [Engine-drivers and some other occupations are specially free from alcoholic intemperance.]

The consumption of beer per head was 24¼ imperial gallons in 1861, 29·7 in 1903, but had been 34 gallons in 1874, a time of prosperity.

The functional and metabolic changes induced in the first instance by the toxic action of the alcoholic beverages lead to a secondary auto-intoxication. They are a frequent cause of chronic gastritis. The mucous membrane becomes thickened and fibrosed. There is chronic congestion, especially in the pylorus. Piles may become extremely irritable.

Page 917. From the action of alcohol on the cells, degenerative changes result. The delicate renal epithelium must suffer from the toxic action. When great quantities of beer are drunk the heart becomes dilated and hypertrophied (Munich and Tubingen " beer hearts ").

Page 965. Bhang, which is the dried leaves of hemp, is chewed or smoked in India. It causes insanity, but not to the extent at one time supposed.

Article on " Metallic and Other Poisons." (Allbutt and Rolleston's " System of Medicine," Vol. ii., Part I., p. 1076.) By Thomas Oliver.

" Arsenic may cause keratosis, thickness of the epidermis, or peripheral neuritis, or even squamous-celled carcinoma." [Cases are referred to by Dr. Jonathan Hutchinson and Professor Allbutt.] " Arsenic is therefore indirectly responsible for growths which subsequently become cancer."

From " Alcohol and the Human Body." Horsley and Sturge.

P. 33. " It is notorious that in the manufacture of beer as carried on to-day in England, malt substitutes, hop substitutes, and various chemicals for preserving beer are frequently used. As the result of the Inland Revenue analysis, during the two years before May 1905 it was reported that samples examined showed the presence of arsenic beyond the limit recommended by the Commission on Arsenical Poisoning; (2) the presence of copper; (3) quillaia bark or essence; (4) alcoholic flavouring essences. A very large number of substances are used for malt substitutes, including many glucoses, saccharin (forbidden), vitriol, salt, bisulphite of lime, salicylic acid, magnesia, tannin, sulphuric acid, and chalk. Caramel, isinglass, sole skins, liquorice, grains of paradise, Guinea pepper, and cocculus indicus (forbidden) are other ingredients. All measures to stop adulteration have failed. Fusel oil is found in whisky.

"It is now proved," says Sir Victor Horsley, "that alcohol, even in tiny doses, paralyses more or less the white cells. The seriousness of this influence cannot be overstated." The proneness of brewers and their draymen to suffer from erysipelas and cellulitis is well known.

Page 199. Beer causes the stomach to become inflamed; in a chronic alcoholic there are patches of inflammation, often of definite excoriation. There may be considerable damage to the stomach without the patient being aware of the fact.

Page 349. "In an investigation which I made," he relates, "as to the persons insured in the United Kingdom and General Provident Institution, I found that the same number living at the same ages which gave 100 deaths from cancer among non-abstainers gave only 71 deaths among abstainers." One of the factors producing cancer is the influence of chronic irritation, and alcohol causes chronic irritation of the tissues with which it comes into contact.

Page 240. Scar tissue is produced in the liver and other organs of the body. I think we may add, that the chronic irritation of alcohol, on the evidence of many physiologists who have studied the subject, is rivalled by the frequent drinking of hot tea or coffee which has largely supplemented or taken the place of alcoholic toxic drinks.

From "The Drink Problem." T. N. Kelynack, M.D.

Dr. Kelynack, in his comprehensive handbook, has stated that through the action of alcohol on the internal organs, as in cirrhosis, &c., "a quantity of scar tissue is usually found, and that through the inflammatory process the cells form fibrillar tissue which constitutes the scar tissue (p. 65).

The contracting scar tissue of a wound has its exact homologue in the contracting scar tissue that is met with in the liver, kidney, and brain. In chronic alcoholism, in which the poison is acting continuously over a long period, a peculiar fibrous condition of the vessels is met with; this apparently is the result of a slight irritation of the connective tissues of the walls of these vessels. The wall of the vessel may become thickened, &c."

The following are his general conclusions (p. 82) concerning the pathology of alcoholism :—

"Alcohol plays a prominent part in bringing about degeneration of nerves, muscles, and epithelial cells; it determines the accumulation of waste products in tissues by paralysing the tissue cells, interfering with oxidation, with secretion and excretion; it induces the proliferation of the lower forms of tissue, often at the expense of the more highly developed tissues, which in its presence undergo marked degenerative changes; it interferes directly with the production of immunity against specific infective diseases; and, reasoning from analogy, it may be assumed that it plays an equally important part in impairing the resistance of tissue by the advance of the active agents in the production of disease that may already have obtained a foothold in the body." These facts seem to have a distinct bearing on the preparation of the soil or of the condition for the growth of cancer.

Notes from Various Sources

In 1896, 600 medical men in Holland, including most of the medical professors and teachers in the Universities of Amsterdam, Leyden, and Utrecht, voluntarily signed a declaration that alcohol is obnoxious in every case and should be given up altogether.

Later a number of leading scientific men, connected with the Universities of Zürich, Basle, Munich, Leipzig, and others published a manifesto declaring that it is an absolute scientific fact, that alcoholic drinks, more than any other factor, injure our national life, diminish the physical and intellectual forces of our people, impregnate them with hereditary diseases, and lead to degeneracy.

The Chamber of Deputies of France set forth in placards all over Paris that "the artificial stimulus that alcohol produces quickly gives place to nervous prostration and weakness. In reality alcohol is useful to nobody, harmful to all."

In 1839 a document protesting against the employment of alcohol in health as injurious to the constitution without any exceptions was signed by seventy-eight doctors, many of them highly distinguished; in 1847 a certificate was published signed by 2000 declaring that a very large portion of human misery, including poverty, disease, and crime is induced by alcoholic beverages, and that the most perfect health is compatible with total abstinence; in 1871 another declaration signed by the President of the Royal College of Surgeons, the President of the Royal College of Physicians, and many others, spoke of the dangers of alcohol requiring "as much care as any powerful drug."

Dr. Brinton found that a single glass often suffices, so to speak, to take the edge off both mind and body.

Sir Benjamin Brodie considered opium much less harmful than gin or brandy.

Dr. Beddoes considered fermented liquors most powerful and hazardous drugs; "in women the digestive organs may be as much injured by a glass of wine as in a robust man by a pint."

Sir A. Carlisle noticed the wonderful renovation of body and mind following total abstinence in broken-down drinkers.

Dr. E. Lankester found that alcohol may injure the coats of the stomach and bring about incurable disease.

Dr. Hufeland declared water to be one of the greatest means of prolonging life.

In later years, in addition to the memoranda and protests mentioned above, over 14,000 medical men signed a petition for the teaching of the evils of alcohol in schools. The profession has certainly led the way to enlightenment and shown cause for the deliverance of the nation from one of its most calamitous perversions.

Dr. Magnan, Chief of the Insane Asylum of St. Anne, wrote that "it is scientific to proclaim that alcohol is a perpetual danger; that it is perfectly useless."

Dr. Legrain, of the Asylums of Villa Earas: "Alcohol feeds crime and madness." "Alcoholism and coffeeism (coffee drinking) often produce effects that are nearly identical."

Professor Kassowitz, of Vienna: "Alcohol disturbs the action of the living cells."

Sir Thomas Barlow, M.D.: "The only remedy is total abstinence; we must banish alcohol altogether."

Sir Victor Horsley: "There is no other substance but alcohol upon which there is such an enormous national expenditure, which is not an essential to life, but which is the commonest cause of poverty, crime, disease, and vice."

Sir Frederick Treves: "The use of alcohol is absolutely inconsistent with a surgeon's work, or with any work demanding quick and alert judgment."

Professor Kraeperlin, after 2000 experiments: "A very small quantity materially slows the nerve and mental processes, retards and weakens perception and judgment."

Sir William Gull: "I hardly know any more potent cause of disease than alcohol."

Sir B. Richardson: "If England could be made sober, the average value of life would be increased one-third."

Professor Nothnagel: "It is a great sin to give children brandy, beer or wine, tea or coffee before the fourteenth year; these irritants do immense harm, and produce the great nervousness of our times. Alcoholism is a poison under all circumstances."

Experiments by Dr. Demme of Berne, in giving light wine, 2 or 3 ounces only, to schoolboys ten to fifteen years old, showed that the boys could not do their work properly, and were weaker during the months of this test.

Dr. Robertson of Stirling District Asylum: "Alcohol is the most important single factor in the production of insanity."

Dr. Robert Jones: "The effect of alcohol on protoplasm is to paralyse irritability, and to diminish sensibility and contractibility, and to suspend the action of all ferments."

Dr. W. B. Carpenter, in his "Human Physiology," gave very cogent reasons against the habitual use of alcohol and in favour of water as the natural drink of man.

Professor Bunge has shown that alcohol poisons the germ cells, and he condemns him "as the greatest criminal who poisons the germ cells"—that is, posterity. [The woman is, if possible, a worse criminal. The effects of her alcoholism are most degrading to the race.]

In the London Temperance Hospital the general death-rate was 7·3 per cent. against 9·1 in all the other hospitals. In the Mildura District Hospital the death-rate was, while alcohol was prescribed, 14, 15, and 12 in three successive years; since alcohol was given up it fell to 8·3, 7, and 5 in three years.

For generations, alcohol, especially in brandy and port wine, has held its place as a curative of particular value in medical estimation, and was largely used for many diseases, and after operations. Happily, "medical opinion has greatly strengthened against the use of alcoholic liquors, both medically and dietetically. Alcohol is almost entirely banished from the hospital."[1]

The cost of stimulants in the hospitals of the Metropolitan

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[1] "Variations in the Consumption of Intoxicating Drinks, &c." By George B. Wilson, Proc. Roy. Statistical Society, Jan. 1912. A very full paper.

Asylums Board has fallen from £1633 in 1896, to £251 in 1909, though the number of patients increased by nearly 2000.

It is strange that quite recently nurses in hospitals still seemed to receive the old teaching in favour of alcohol; very few knew that brandy lowers body temperature, and the fact was almost ignored except in very progressive institutions. The removal of brandy must be an immense comfort to patients whose sleep is destroyed by such stimulant depressants.

As the result of numerous experiments by various workers, and of clinical experience, it is found that alcohol diminishes the number of leucocytes and their power of leucocytosis.

Also alcohol diminishes the opsonic power of the blood, so that, for instance, 2 oz. of port wine cause an average fall of 37 per cent. in the opsonic index for tubercle bacilli, and 42 per cent for streptococcus.

The mortality rate in pneumonia is, for total abstainers 18·5 per cent; for moderate drinkers 25·4, and for the intemperate 52·8.

For those districts of France where the alcohol consumption is 12·5 litres per head, the tuberculosis death-rate is 3·3; where the consumption is 35·4 litres, the death-rate is 10·8 per 1000.[1] The rate for cancer will be found, I think, to be similarly increased in the alcoholic districts, though to a less extent.

Canada and New Zealand have been progressive in restricting the sale of liquor. On the other hand, the consumption of alcoholic poison has been allowed to grow very rapidly under the British authority in India, in Egypt, in Natal, in West Africa, and other Protectorates; so that the multitude of diseases and crimes which follow the habit are certain to increase in these countries.

The statistical abstract published in 1911 of the consumption of intoxicating liquors in the British Empire during 1909 gives the following figures:—

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[1] "Alcohol in its Relationship to Disease of Bacterial Origin." By Arthur Evans, M.D., M.S.

	Beer per Head.	Spirits per Head.	Wine per Head.
	Gallons.	Gallons.	Gallons.
United Kingdom	25·9	0·69	0·25
Australian Commonwealth	11·0	0·78	1·08
New Zealand	9·7	0·74	0·14
Canada	5·3	0·81	0·10
Newfoundland	0·3	0·39	0·04
Cape of Good Hope	1·1	0·39	1·22
Natal	0·6	0·25	0·06
Orange River	1·2	0·24	0·12
Transvaal	2·4	0·49	0·32

III. EXCESS IN TEA AND COFFEE

Report of Commission on Physical Deterioration

It was reported that in Manchester a fruitful and most unsuspected cause of deterioration was the long ingrained habit of tea-drinking at breakfast and at other times in the factories and foundries of the city. A dark and strong stew is left to stand, and the mixture is drunk sometimes three or four times a day by hundreds of young lads, setting up frequently various forms of varicocele, and is responsible for several kindred evils. The chief recruiting officer gave information that a large proportion of young men rejected for the army were rejected on account of ailments brought on by tea-drinking.

Colonel Leatham also found that a large proportion of those rejected were heavy tea-drinkers.

Dr. Hawkes of Finsbury pointed to the terribly excessive use of tea by women workers. At a large metropolitan dispensary 80 per cent. of the women and girls who came under his notice had no solid food, only tea, before the middle of the day; pickles and vinegar and tea were then largely taken as a part of the solid meal; tea was again drunk in the afternoon; three or four pints of poisonous stuff were absorbed in the course of the day. An enormous amount of dyspepsia was thus produced.

Notes from Various Sources

Dr. Robertson Wallace: "Tea allowed to brew more than a few minutes contains extractive matters . . . in the highest degree inimical to the mucous membrane." A stomach deluged with tea "must sooner or later become inefficient . . . for it is being over-stimulated, and the power of its secretive glands is being weakened by the perpetual *irritation* to which it is subjected." . . . "The chronic tea-bibber is often characterised by anæmia," &c.

Sir Lauder Brunton: Tea with animal flesh should be altogether avoided. Coffee causes nervous symptoms, palpitation, irritability, &c.

Professor Mendel, Sir William Roberts, Dr. Kellogg (who has studied the subject in his great sanitarium), Dr. Combe, Dr. Sharper, Mr. Graham, and many others have given similar testimony.

Major Craigie: Over tea-drinking is the cause of numerous evils. Among the poor, women living on tea and bread suffer much from anæmia and dyspepsia.

Professor Gilman Thompson: The United States consumes 1·33 lbs. of tea, 7·8 lbs. of coffee per head. By the frequent use of strong coffee muscular tremors, nervousness, palpitation, dyspepsia, insomnia may be produced.

It has been calculated that the coffee imported into the States is six times as much as would be required, if given in single doses, to kill every inhabitant of the globe.

Dr. Eugene Talbot alluded to the nervous symptoms from which tea-tasters suffer, and to the nervous dyspepsia, excitement, irregular heart-action, &c., caused by tea.

Dr. Page found that all poisons and stimulants, such as coffee, tea, tobacco, &c., tend to cause local and general paralysis.

"Coffee destroys brain and kidney, a fact now universally recognised and advertised throughout America; and tea tans the entrails and turns the stomach into leather bags."[1]

A letter in the *British Medical Journal* called attention to the evils caused by tea and coffee, which all admit to be drugs, in children. "Children coming to the hospital in a condition of great nervous trepidation, are invariably found to have been given tea and coffee from an early period in their lives."

Dr. Alcott, from forty years' observation, found "heart-trouble" the greatest evil produced by these drinks.

Sir T. Clifford Allbutt writes: "The sufferer from coffee excess is tremulous and loses his self-command; he is subject to fits of agitation and depression. Symptoms of gastric catarrh may be manifested. The heart also suffers. . . . As with other such agents, a renewed dose of the poison gives temporary relief, but at the cost of future misery. . . . In Watson's language, by removing coffee they get rid of their palpitation and of their apprehensions together.

"Tea affects the heart, but not so directly. Many obscure cases of gastralgia are due to tea, and also dyspepsia of the so called atonic kind. It may produce an extreme degree of physical depression, gastralgia, palpitation, acute giddiness and confusion. By miseries such as these a man may find the best years of his life spoilt."

Allbutt and Rolleston's "System of Medicine," p. 988:—"Tea causes much indigestion and nerve trouble. In out-patient departments in the north of England very obstinate cases of atonic dyspepsia occur, with loss of flesh, in miners, engine-drivers, and others. The state is a grave one, and leads gradually to the loss of working power, so that at fifty such a patient may become useless and miserable. This condition is largely attributable to the use of tea by the canful."

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[1] "A Modern Utopia," p. 73. H. G. Wells.

Dr. Risdon Bennett, M.D., F.R.S., described the volatile oil of tea as causing giddiness, headache, and tremors and wakefulness, and the tannin as causing indigestion, and coffee as causing similar effects.

Tea and coffee are reported to contain volatile oils which produce characteristic harmful effects,—nervous excitability and disorder, &c. It is not certain how much of the evils resulting from tea and coffee drinking is due to the caffeine and theine, and how much to the essential oils. Wolfe the physiologist showed that 3 grains of caffeine, which might be contained in a cup of coffee, seriously impairs the quality of the gastric juices, and Roberts that tea and coffee greatly interfere with the action of the saliva.

Dr. Clennell Fenwick, in a contribution to the *British Medical Journal* in 1909, observed that there was a persistent increase of cancer in New Zealand; that the alimentary tract was the seat of invasion in the great majority of his cases; that all the cases affected led healthy lives; that they were all hearty, some of them very large, eaters of meat, and all drank tea with all their meals, and frequently between meals. The tea was taken very strong. Over-indulgence in tea is commoner in males than in females in New Zealand. The male death-rate was unusually high. On the West Coast in the mining townships Dr. Britton found the diet to consist of frying-pan meat and billy tea. The billies were emptied of tea-leaves once a week, and the billies always showed signs of corrosion. Chronic rheumatism was universal.

A report from Mr. Thomas Harington, Director of the Department of School Hygiene, Boston, U.S., and Representative of the U.S. Government to Paris and Brussels Health Congresses, appeared in the *Times* of August 20, 1910. The following are extracts from this document, in which many important suggestions were made:—"The results of a recent investigation of more than 90,000 public school children show that the best results are obtained by home and school co-operation." 22,000 homes were visited, and children's defects pointed out and attended to. 34 nurses were employed. "All this co-operation has resulted without one complaint of interference. . . . Indifference to ordinary laws of sanitation and hygiene and feeding were very constant factors. 9000 children were sent to hospitals, 7500 referred to the family physicians. . . . A great part of the underfeeding among all classes is not due to poverty, neither is anæmia an index to nutrition. . . . Too often the money was spent for pickles and candies. *By far the most common and pernicious factor is tea drinking among children.* As used now tea ranks very high as a cause of much of the ill-health. . . . *It is a great national evil.*"

On the same day, a leading article in the *Times* quoted the demand by Professor Pearson for an investigation into the character of the offspring of moderate and immoderate beer, spirits, and tea and coffee drinkers, reaching back to the grandparents. The inquiry is needed, but it is really too late, for the addiction to all these articles has now been so long in time and so wide in spread that nearly all, probably all, children now living are more or less affected by inherited effects. In a great many cases, I think, the children of alcoholics or excessive tea-drinkers suffer more than the erring parents from the influences of the several poisons.

In "A Study of the Diet of the Labouring Classes in Edinburgh,"[1] which gives elaborate and valuable information, instances are given such as the following: "The children drink tea five or six times a day, and get a piece of bread whenever they ask for it. The mother owns to living on tea and potatoes."

There is "the greatest ignorance among all classes in this country, and, in fact, in all countries." . . . It has been shown that a fairly good diet can be procured for 4d. per man per diem, while the average price paid is about 7d. The Seamen's Federation diet is a very liberal one, with less work than that of an ordinary labourer, giving "170 grammes of proteid and 4,526 calories of energy." This is certainly plethoric. The cancer rate of the Merchant Seamen is much above the average.

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[1] By Dr. Noël Paton, M.D., B.Sc., Dr. J. Crauford Dunlop, M.D., and Miss Inglis. Otto Schulze & Co., Edinburgh.

Nansen, the explorer, was obliged to give up tea and coffee and keep it from his men, owing to their interference with sleep, even when used in small quantities. In Greenland he ascertained that coffee, like brandy, "contributed not a little to the decline of the race." Similar testimony seems to be given by a recent book on the Eskimo.

The *British Medical Journal* declared that it is well known, and that English physicians have laid great stress on the point, that the abuse of tea and coffee often brings on gastralgia, dyspepsia, and more or less disturbance of the apparatus of innervation.

Sir William Broadbent, in his book on Heart Disease, stated, in relation to aneurism, that soups, game, salt fish, rich sauces, beer, and tea should be forbidden, and meat be used in moderation, owing to the danger of retention of toxic materials in the blood. The frequent association of heart disease, rheumatism, and cancer, and the great increase of all these maladies with rich feeding and toxic drinks makes this quotation apposite to the present purpose.

Dr. Church Paterson states that it is established that auto-intoxication, from the absorption of poisonous substances generated in the alimentary canal by putrefaction and fermentative processes, is not only a real thing but a frequent factor in the etiology of a number of nervous disorders and even of graver maladies like epilepsy, melancholia, and mania. Simplicity should be the rule as regards food.[1]

Prof. Dixon, in his "Manual of Pharmacology," states that caffeine is a true cerebral excitant, that large doses of caffeine from tea or coffee may even cause toxic convulsions, a profound change in the muscle protoplasm, and increased blood pressure.

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[1] "Nervous and Mental Diseases."

Mr. Graham describes the infusions of tea and coffee as among the most powerful poisons in the vegetable kingdom.

Even in Wesley's time "eminent physicians declared," as he said, "that tea is no other than a slow poison," and through tea-drinking "abundance of people" had suffered from paralytic [*sic*] disorders, their nerves quite unstrung.

Many medical men have noticed the effect of tea-drinking in producing insanity. The Irish Lunacy Commission attributed part of the insanity in Ireland to reckless tea-drinking. The Medical Officer for Dorsetshire was convinced that in many cases strong tea caused brain disease in the labouring class.

Sydney Smith only discovered late in his career that "digestion is the great secret of life." He wrote in 1836: "By eating little and drinking only water, I keep *body and mind* in a serene state." As in the case of Wesley, his miseries all departed when he adopted a natural diet.

Tea and Coffee. Return to an Order of the House of Commons, 1902

Coffee Consumption in Pounds per Head

Year.	German Empire.	Holland.	Belgium.	France.	Austria-Hungary.
	lbs.	lbs.	lbs.	lbs.	lbs.
1884 . . .	5·28	19·53	7·67	3·94	2·01
1885 . . .	5·55	16·17	9·85	3·94	2·06
1886 . . .	5·77	5·07	10·0	3·93	2·0
1887 . . .	4·7	18·17	6·84	3·67	1·76
1895 . . .	...	16·49	8·23	4·13	1·94
1896 . . .	...	16·67	8·23	4·29	2·0
1897 . . .	...	23·16	9·68	4·41	2·06
1898 . . .	6·2	21·38	10·19	4·51	2·16
1899 . . .	6·2	19·57	10·7	4·62	2·05
1900 . . .	6·29	16·57	8·5	4·66	2·06
1901 . . .	6·66	18·82	10·53 (Provisional)	4·79	2·17 (Provisional)

Tea Consumption in Pounds per Head

Year.	United Kingdom.	West Australia.
	lbs.	lbs.
1884	4·90	...
1885	5·07	...
1886	4·93	...
1887	5·02	...
1895	5·67	9·31
1896	5·77	11·5
1897	5·81	8·87
1898	5·86	9·45
1899	5·98	9·37
1900	6·10	10·07
1910	...	10·07
1911	6·53	...

A good substitute for tea and coffee, largely used in some parts of Europe, is an infusion from ground roast grains of barley or wheat. The grains can be roasted and ground at home, and made into a drink after the manner of coffee; several mixtures of the kind are also on sale.

The connection of a number of cases of cancer of the lip, mouth, and throat, with smoking has been touched upon in the earlier chapters. Here I will only quote Sir Malcolm Morris: "The constant habit of excessive smoking over a long series of years produces much functional mischief and misery. It frequently disturbs the equilibrium of the nervous system, causing giddiness, nervousness, muscular tremor, and palpitation. It impairs digestion, &c. Cancer of the lip and tongue and chronic inflammation of the back of the throat are often ascribed to it."

APPENDIX IV

"Histoire civile, religieuse, et littéraire de l'Abbaye de la Trappe, &c." Par Mons. L. D. B., Membre de Plusieurs Académies de Paris, 1824.

Describing the Trappist Monastery, a French author of 1824 states that only vegetables, roots, herbs, and milk were served in the refectory. Only one portion of any cooked dish was allowed. Stewed pears or milk or cheese might be added, but no butter or fat. No pastry, cream, white bread, spices, or wine were allowed. One "chopine" of beer or cider was provided. In the memorial by the Abbots of La Trappe to the Pope in 1664, it was affirmed that abstinence from meat was general in the order of Citeaux, by the rule of St. Benoit and ancient statute. The numbers of monks and novices was in 1676, 46; in 1678, 48; in 1720, 149; in 1791, 95; in the middle of the eighteenth century, 150.

"A Concise History of the Cistercian Order." By a Cistercian Monk. 1852. "The Use of the Cistercian Nuns of Our Lady of La Trappe." Published 1852.

In the convents of La Trappe two kinds of bread were made, white and brown. The allowance was 1 lb. per day. Potatoes might at all times be added. At supper 4 oz. of bread were given to those who had left no bread at dinner. The drink was cider, beer, or wine, if the common drink of the country. A pint was the usual measure at dinner or supper. In monasteries where wine was used, the monks had a pint a day. At dinner, two cooked portions were served, including the soup, in which were neither butter nor oil; cheese with celery, salad, pickles, or the like might be served as a regular portion. For supper two portions were allowed, as milk, salad, roots, vegetables, or cheese. Meat or fish was never served in the refectory. Butter and eggs were forbidden to those in health. Cream or oil was permitted only for vegetables and salad. No pastry or cakes were permitted. For collation, 8 oz. were given, two of which might be cheese or fruit, dried or preserved. A dessert of fruit, radishes, &c., might be served at dinner.

From a book by Philip Sidney (1905) we learn that the Carthusians at St. Hugh's, Parkminster, have nearly as rigid a rule as the Trappists; they eat no flesh, and break their sleep by a midnight service of two hours; the long standing and the return to their cells in cold weather is very trying. "When monks are living away from their headquarters, working on missions, they are apt to relax their rule and give way to intemperate habits." This makes it difficult to estimate the freedom from cancer of those monasteries which maintain missions.

It is instructive to compare the above dietaries with the common fare of a country like Holland, which has one of the highest rates of cancer: bread and cheese and butter for each of the three meals; coffee, beer, and "steaming grog." Even in workhouses, half-a-pound of cheese is allowed per man for breakfast and for supper, with half-a-pint of beer or coffee.

APPENDIX V

Dr. Farr found that of 60 prisons divided according to high, low, and intermediate diet, the annual attacks of sickness and the mortality were :—

	Sickness.	Mortality.
In the low	140	1·48
In the high	212	3·44
In the intermediate	93	2·93

The number of prisoners concerned was 267,800.

It is clear from this that severe and fatal maladies were incident much in proportion to the amount of food. A similar proportion holds in the general population *where other conditions are equal.*

There would yet probably be a certain amount of illness in the low diet class owing to improper or insufficient nutriment, so that allowing for this, the excess of mortality and illness in the better-fed is the more striking. There is, as Dr. de Chaumont observed in 1879, a form of starvation very common among the poorer classes, depending on want of vegetable food. This starvation "formerly caused terrible ravages in the army and navy, resulting in scurvy." Recent researches have shown that scurvy was largely owing to tainted meat, developing ptomaines, as well as to want of fresh vegetables. Fat, Dr. de Chaumont observes, " is a most essential thing, and no hard work can well be done without it."

Sir Edwin Chadwick observed in his "Health of Nations," that, where diet had been reduced in prisons, mortality had in *no instance* increased, but generally diminished. Where animal food was diminished, and vegetable increased, sickness was reduced.

It is clear from many statistical data that cancer is one of the fatal maladies increasing in frequency by excess, and that the low rate of incidence in prisons of this and some other disorders is a consequence of the moderation and regularity enforced.

APPENDIX VI

THE WEALTH OF THE EMPIRE

In his address to the Economics Section of the British Association, 1903 ("Economic Studies and Inquiries"), Sir Robert Giffen, K.C.B., stated that in 1881 a committee of the British Association found that of £878,000,000 spent by the people of the United Kingdom, £500,400,000, or 56·9 per cent., was spent on food and drink, £147,800,000 on dress, £121,700,000 on house, including rent, furniture, coal, gas, and water. More was spent on tobacco than on education; more on tobacco than on churches, or literature, or newspapers.

But with a fall of prices and other changes, the proportion in 1902 was not quite so high. Still, including taxes on articles of consumption, the amount was not far from £600,000,000. "The first point that occurs to me is the enormous expenditure on food and drink." Part of this is economic waste, proceeds Giffen. The diet of prisons and workhouses is quite sufficient for health, and with no great additions, would be found sufficient for work. The waste in certain directions would go far [it would go more than the whole way] to provide the expenditure on food required for the under-nourished.

The highest expenditures are on flesh and on beer, wine and spirits, and were estimated in 1902 at £130,000,000, while beer was estimated at only the wholesale cost at £70,000,000, and wines and spirits at £15,000,000. The total cost of all distribution of articles of food and drink, dress, and miscellaneous was put at £200,000,000. In the case of beer, the cost of distribution appeared to be about £43,000,000 in 1902. Further, Sir Robert Giffen proceeded (page 371): "we find that 42,000,000 of people in the United Kingdom consume in food and drink alone, if we take the expenditure at the retail point (after distribution), an amount equal to the whole income of 300,000,000 of people in India."

In his paper on "The Recent Rate of Material Progress in England," printed in "Economic Studies," 1887, he stated that the tea and sugar consumption per head in lbs. was as follows:—

	1855.	1865.	1875.	1885.
Tea	2·3	3·3	4·4	5·0
Sugar	30·6	39·8	62·7	74·3

He regarded the increase in tea and sugar as especially significant, consumption being in 1882 four times what it was in 1840 (page 404, Vol. I.). Tea is put at 1·22 in 1840, and sugar at 15·20 (page 403, Vol. I.).

He described the Americans optimistically as generally total abstainers (page 56, Vol. II.). "In that great country there is no such thing as a good birth- and death-rate." This was in 1887.

The following is from the Report of the Committee of the Royal Statistical Society on the consumption of meat and dairy products, compiled by Mr. R. H. Rew:—

	Meat, lbs.	Cheese.
United Kingdom	122	10·5
Denmark	76	...
France	80	8·2
Germany	99	...
Belgium	70	...
Holland	...	11·0
Sweden	62	4·6
United States	150	3·7
Australia	262	3·5
New Zealand	212	...

In 1863 Mr. Edward Smith's Report put the weekly consumption of meat in a labourer's family at 1 lb., and of cheese 3⅓ oz. "Our predilection for cheese is shared with the Dutch."

In the Report of the Assistant Commissioners on the employment of children, estimates in six counties gave 34 lbs. of pork or bacon consumed annually by labourers.

In 1878 Mr. Little's estimate was 42 lbs. for a labourer and family.

The meat consumed yearly per head in the five years ending May 1903 was as follows:—

Artisans, mechanics, and labourers	107 lbs.
Lower middle-class	122 ,,
Middle-class	182 ,,
Upper	300 ,,

Tinned, and potted meats, tongues, heads, liver, tripe, &c., are not included. The increase of these per head is great.

In a paper read before the Royal Statistical Society by Mr. George B. Wilson, it was stated that there has been a steady decrease in the consumption of beer and spirits since 1899, that the alcoholic mortality shows no apparent relation to the consumption, that plenty of employment corresponds to well-filled prisons, and that in Ireland in the last 20 years spirits are drunk less by 42·86 per cent., beer more by 44·89 per cent.[1] There are reasons, I think, for expecting that no large decrease in alcoholic mortality and in cancer from alcoholism would take place till after a longer period of decreased consumption, and a more general growth of temperance.

Last year, 1911, the amount spent in liquor in the United Kingdom again increased.

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[1] *Proceedings of the Royal Statistical Society*, January 1912.

APPENDIX VII

From *Yale Review*, January 1912.

In an investigation into the cost of living among various representative classes of people in New York City,[1] it was found that 89 per cent. of the Italians were well nourished, 86 of the Germans, 60 of the Americans and Negroes, 55 of the Irish, 40 of the Bohemians, and 33 of the Russians. The few families of Austrians, Hungarians, English, Dutch, and Swedish all belonged to the well nourished. The Italians and the Dutch, it was found, obtained their proteids largely from the vegetable kingdom; the Bohemians, Negroes, Americans, English, Irish, and Swedes about equally from animal and vegetable sources; the Russians, Austrians, Hungarians, and Germans from the animal kingdom mainly. The Russians and Austrians spent the largest percentage on flesh, the Italians the smallest. The Italians make their bread at home. There is a great waste of money from want of knowledge of food values. "In general, it is largely our acquired desire for something stimulating to the palate, not our need for food, that makes our present mode of living so costly."[2]

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[1] Special Committee on the Standard of Living in New York.

[2] "The Cost of Adequate Nutrition." By Frank P. Underhill.

APPENDIX VIII

There can, I think, be no doubt, taking all the evidence into consideration, that the chief causes of internal cancer—that is, of the great majority of cases—are stimulants and irritants, comprised under the following heads:—1. Alcohol. 2. Beer, sour wine, and cider especially. 3. Coffee and tea. 4. Excess of food, especially of proteids such as cheese, animal flesh, &c., leading to obstruction, putrefactive and microbic toxication, and plethoric conditions. 5. Hot foods and drinks, very far above the body temperature. 6. Irritants such as pepper, mustard, curry, and possibly onions, daikon, and sharp pickles.

Communities using these in excess have the highest rate of cancer, those using least have the lowest rate, those using none have apparently no cases of the disease, and those using them very moderately have a moderate rate.

In the following table I have endeavoured to condense a very rough estimate of the addiction of various nations to four of these excesses, leaving out of account hot food and irritating condiments, as not capable of comparison, and as generally in use. A signifies alcohol, 2A a very large consumption, ½A a moderate consumption. B stands for beer or cider, C for coffee or tea, and E for excess of food. H, where given, signifies hot food in reported excess or deficiency.

	A	B	C	E
England	2	2	2	2
Scotland	2	1	2	2
Ireland	1	1	2	...
Canada	½	½	1	2
Australia	1	1	2	2
New Zealand	1	1	2	2
North-East Ireland	1	1	2	1
South-West Ireland	1	...	1	...

	A	B	C	E	
Nairnshire	1	½	2	1	
Orkneys	½	...	2	...	
Edinburgh	1	1	2	1	
Holland	1	1	3	2	
Belgium	1	3	1	1	
Northern and Central France	1	2	1	...	
Normandy	1	3	1	...	
South-East and North-West France	1	...	½	...	½ H
South Germany	1	3	1	1	
Prussia	1	1	½	½	
Switzerland	1	2	1	1	
East Switzerland	1	3	1	2	
South Switzerland	½	½	½	...	
Denmark	2	1	1	1	
Scandinavia	1	1	2	1	
North Italy	1	...	1	1	
South Italy	½	...	½	...	
Sicily, Sardinia, Corsica	½	...	½	...	
Florence	1	1	1	1	
Naples	1	...	½	...	
North United States	½	½	2	2	
Austria	1	1	1	1	
Hungary	½	...	½	...	
Abyssinia	...	1	...	1	H
Uganda	...	1	...	...	H
Tibet	1	1	3	1	H
Argentina	1	1	1	2	
China (towns on coast)	...	...	1	½	H
China (country)	...	...	1	...	H
Japan	...	...	1	...	H
Bulgaria	½	...	...	...	
Roumania	½	...	...	...	
Servia	½	...	...	...	
Spain	1	...	¼	...	
Portugal	1	...	¼	...	
India (Hindoos living on *plain* rice or millet)	...	...	...	...	
Borneo	...	...	...	...	
New Guinea	...	...	...	...	
Burmah	...	...	¼	...	
Siam	...	...	¼	½	
North Africa, West Africa, South Africa (plain living)	...	...	...	...	
Mexicans (plateau)	1	...	½	½	
Mexicans (plains)	...	...	...	...	

Occupations

	A	B	C	E	H
Brewers	1	3	1	1	1
Innkeepers	1	3	1	1	1
Hawkers	1	3	1	1	1
Commercial Travellers	1	2	1	2	1
Coachmen	1	2	1	2	1
Sweeps	2	2	1	1	1
Butchers	1	2	1	2	1
Clergy	½	½	1	½	1
Mariners	1	2	1	2	1
Doctors	½	½	1	½	1
Farmers	½	1	1	1	1
Farm Labourers	½	1	1	...	½
Miners	1	1	1	...	1
Temperance Society Members	...	...	2	1	1
Prisoners	...	...	½	...	?
Inmates of Asylums	...	...	½	...	?
Monastery Inmates	...	...	...	...	?
Battle Creek Inmates	...	...	...	...	?
Doukhobors	...	...	...	...	?

In the case of abstinence from alcohol, beer, &c., the reduction in the cancer rate is known to be 28 or 29 per cent. below the mean.

If abstainers were also to abstain from tea and coffee, it seems, judging by the prison and institution rates, and others still lower, that their cancer rate would be reduced to about 30 or 40 per cent. of the mean, or less.

If they were also to be moderate in eating, down to the Institution standard, it might be reduced to 20 or 25 per cent. of the mean. And with further abstinence from condiments, hot food and drink, it would be likely to be under 10 per cent.

Flesh-eating in itself, apart from excess or common adjuncts, is certainly not a large contributing cause of cancer, for the very moderate flesh-eating peasantries of Normandy, Norway, Switzerland, South Austria, &c., have about the highest rates of all.

On the other hand, beer and cider, and tea and coffee are very potent causes, for where they are largely consumed cancer is prevalent, even where other factors are absent. And it is not very uncommon, as any of us may have observed, for persons who have lived temperately in every way, with the one exception of hot food or hot stimulant drinks, supposed innocuous, to be attacked by the malady. Personal experience during the weakness following a severe illness proves that not only condiments, but such substances as cheese and pungent vegetables may in certain constitutions produce instant sudorific effects, showing some kind of powerful stimulus or irritation.

The proportion of cases arising from condiments, and from foods and drinks ingested at high temperatures, might without great difficulty in course of time be approximately ascertained by careful comparative investigations of groups under particular determinate conditions.

In order to reduce the wide prevalence of a malady of extreme gravity, it would be a worthy enterprise for the State to undertake experimental trials on a large scale, for which workhouses, prisons, and asylums are well adapted, of the effect of different dietaries, and of several regimens already known to be salutary, on rates of illness and mortality, in comparison with equal numbers of the outside population.

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Printed by BALLANTYNE, HANSON & CO.
Edinburgh & London

2/9